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The duties in connexion with the aforesaid services devolve almost exclusively upon the permanent officers of the Royal Army Medical Service. Their work, as every one at the seat of war knows, has been quite marvellously well done. And what stands already very high in the esteem of all the world needs no more words of praise from me.

There remains the *Service for the Treatment of the Sick and Wounded*. After supplying all the multifarious duties just enumerated, there are very few medical officers of the permanent staff of the Royal Army Medical Corps left over. Hence nearly the whole care of the sick and wounded has fallen to the civil practitioners enlisted for temporary service with the Royal Army Medical Corps. For this, if for no other reason, it must be the special concern of the civil profession to do all that in it lies to help the Medical Staff of the Army to employ to the best advantage the civil practitioners now serving as medical officers in military hospitals.

What has been done in the way of regulating the work of these new-joined medical officers has been to transplant practically unaltered into the military hospitals the organisation under which medical practitioners work in civil life and in peace.

The treatment of the sick and wounded is committed, as it is in private and hospital practice at home, into the hands of individual practitioners, there being assigned to each a certain number of patients, or a ward. And, just as at home, where each medical man is in practically independent charge of his cases, and is free to follow whatever treatment appeals to him, so is it in the military hospitals. And just as at home the free exercise of private judgment carries with it an exclusive responsibility, saving only in those cases where a consultant is called in to advise, so also is it in the military hospitals.

Now, I submit that this unchartered freedom can work for good only in conditions such as those which surround us at home. At home, the practitioner finds himself practically always upon ground with which he is familiar. The cases which he deals with in his practice are similar to those he has seen treated in hospital. And if he should find himself upon unfamiliar ground he will, before he need take action, have time to inform himself. Moreover, though new science filters in slowly, it does filter in. And, finally, when the medical practitioner at home makes a new experiment in treatment, he—and this is the all-important point—does learn what results. He can, therefore, profit from the teachings of experience.

Now, the conditions in military hospitals abroad are quite different



from these. The practitioner is there on quite unfamiliar ground. He has to confront unfamiliar problems—problems in connexion with projectile wounds and wound infections. He has to take immediate action. He has very little opportunity to find out what has happened in similar cases. And lastly—and you will see that upon this point everything pivots—he has very little opportunity of seeing the results of his work, and learning whether his treatment has been wrong or right. For the military hospitals in France, both at the front and also at the base, have now, through military necessity, become little more than clearing hospitals, from which cases, if at all fit to travel, are immediately sent upon their homeward journey.

There are thus lacking in the military hospitals in France all those provisos and safeguards which alone can make successful a system in which each medical man is a guide to himself. And carried out without those safeguards that system is unjust both to doctor and patient.

The doctor feels himself left in the lurch when he is not warned off from trying experiments in treatment which a hundred others have unsuccessfully tried. He fain looks for a lead where a successful treatment has been discovered. And, where there are a number of alternative treatments, he would be glad to see comparative experiments instituted to tell him which method is best. Nor is the doctor the only person interested. The patient, his relatives, and the whole nation would, once their thoughts were directed to the matter, feel that they had the vital interest in making the work of the medical officer as effective as possible.

If this is to be done it will, I believe, be necessary to make a fundamental change in the organisation of the Medical Service—to break away from the principle of free arbitrament in treatment for the Medical Officer, and to provide that all treatment shall be regulated by orders and instructions.

These are, as you see, very big issues. It is a question of a conflict between our cherished professional tradition that every medical man must be quite unfettered in his choice of treatment; and the very foundation principle of the Army, that every man shall work, not as he individually thinks best, but as part and parcel of a great machine.

The question as to which of these shall give way to the other must, of course, be decided by the balance of public advantage. And we cannot seriously doubt as to which side that balance inclines. We have only to consider what has been achieved in this war by antityphoid inoculation, and the preventive injection of antitetanus serum; and to

compare the brilliant results of these measures, enjoined as they are by direct instructions from headquarters, with the results which would have been obtained if their carrying out had been committed to the individual judgment of medical men who had not had before the war any opportunity of convincing themselves by personal experience of the utility of either antitetanus or antityphoid inoculation.

If now, as we see is the case, considerations of public utility commend the control of treatment of the sick and wounded by orders and regulations, let me in conclusion very briefly consider with you how under such a system there might be obtained a maximum of advantage with a minimum of disadvantage. I shall, of course, indicate only in very broad outlines what would seem to me to be the requirements.

I believe there would require to be a Professional Head to the Service for the Treatment of the Sick and Wounded. He would, of course, be subordinated to the Director-General, and his duties would be to bring up the work of the medical officers everywhere to the highest standard, and to co-ordinate their work from hospital to hospital.

It would further, I think, be necessary to have an Advising Committee who should be charged with the duty of synopsising the clinical experience won in the war; of finding out what results the various therapeutic procedures had given; and of drawing up on the basis of these inquiries general instructions and recommendations for the treatment of different categories of cases. On a Committee of this sort one would, of course, wish to see representatives of surgery, of medicine, of the various specialities, and of pathology and bacteriological science. But one would wish to see the membership restricted to those who were actually at work at the seat of war, and who were prepared to take full responsibility, and carefully to watch the working of the recommendations, and at any moment to revise them in the light of accumulating experience or further laboratory experiments.

Finally, one would wish to see attached to such a committee a Research Department for the resolution of all bacteriological questions arising in connexion with hygiene, surgery, and medicine. And I may perhaps be allowed, in connexion with this last, to point out that the Medical Research Committee of the National Insurance Act, under whom I have the honour to serve as Director of Bacteriological Researches, has, since the outbreak of the war, been placing not only large funds but a carefully selected corps of skilled workers at disposal for the prosecution of researches directly contributory to the better treatment of the wounded. It is for you to see that full advantage be taken of the results as they are obtained.

PROCEEDINGS  
OF THE  
ROYAL SOCIETY OF MEDICINE

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VOLUME THE EIGHTH

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COMPRISING THE REPORT OF THE PROCEEDINGS FOR THE  
SESSION 1914-15

NEUROLOGICAL SECTION



LONDON  
LONGMANS, GREEN & CO., PATERNOSTER ROW  
1915

## Neurological Section.

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## Neurological Section.

January 28, 1915.

Dr. H. G. TURNEY, President of the Section, in the Chair.

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### PRESIDENTIAL ADDRESS.

#### The Vasomotor Neuroses.

BEFORE I enter upon the subject with which I propose to deal to-night I feel that a word of explanation is due to the members for the state of suspended animation in which our Section has been allowed under my Presidency to remain for the past few months. It was not due only to the War, though that might in itself be considered sufficient excuse. Our programme provided for two meetings only before Christmas: the one was the Jacksonian Lecture to be delivered by Professor Dejerine, the other (*magnis componere parva*) was the Presidential Address to be given by myself. Professor Dejerine's lecture was obviously out of the question; the French Government at the time had been removed to Bordeaux and the actual investment of Paris was a possibility of the immediate future. Our Secretary tells me that after considerable delay he has succeeded in communicating with the Professor, and he gives us ground for hoping that at a more convenient season we shall have the honour of receiving him. This enforced absence of Professor Dejerine left my address as the only ground for a meeting, and in the exercise of what I have no doubt you will consider was a judicious discretion, I decided on the appeal of the Secretaries to postpone it to the New Year.

And now, having given you this explanation, I must proceed with the annual presidential assertion of personal unworthiness, which, however much a formality both with my predecessors and by anticipation with my successor, is a reality as regards myself. And yet I almost fear to offer it. This is a time when it might well be thought that an

apology stands itself in need of an apology in view of the degree of self-consciousness which it may be taken to indicate. To that I can only plead that mine is dictated rather by my deep sense of the honour which the occupation of this chair confers than by thoughts of the particular degree of my unfitness to hold it.

But the apologies which I offer for myself are not needed for the subject I have chosen. There are several reasons which combine to make the present a favourable time for taking stock of vasomotor disorders on their neurological side. It was on that side that the foundations of our knowledge were well and truly laid by the English School of Physiology, of which we are all proud, by men such as Gaskell, Sherrington, Langley, and Bayliss. Fresh lines of research have, however, tended of late years to divert attention in other directions. Close upon and partly concurrent with the era of study of reflex mechanisms came that of bio-chemistry, concerning itself at first mainly with the internal secretions which we associate with the names of Schaefer, Starling, Murray, and others; while, following this, but more or less coeval with it, we have the more frankly chemical age of Dixon, Elliott, and Dale. Take for example, acetyl-cholin, which has recently been investigated by Dale; he describes it as a vasodilator without any significant effect on the heart, which acts in far smaller doses than adrenalin itself—in a dilution, in fact, of 1 in 1,000 million. On the bacteriological side the phenomena of anaphylaxis are equally impressive illustrations of chemical action in relation to the circulation. Chemical agents, then, sometimes in the form of definite compounds of known constitution, sometimes as hormones, the products of glandular action, and sometimes, as in anaphylaxis, in the form of bodies whose very existence we can only deduce from their results, produce effects which in their suddenness, in their disproportion to any ascertainable cause, and in their specific influence upon certain nerve paths, satisfy most of the conditions which not so many years ago would have been regarded as proof of reflex action. The chemical aspect of vascular reactions is therefore one of enormous importance and of growing interest; on the Continent a very able group of observers is attempting to establish a diagnostic scheme of the vasomotor neuroses on a purely chemical basis.

And if, as regards the vasomotor neuroses, the field of pure neurological activity has been invaded by the chemists on the one side, there are no less active encroachments by the flying squadrons of the psychologists on the other. As special manifestations of functional

disease they have been subjected to examination from what some would call the higher plane of psycho-analysis. This, however, is an aspect of the subject which has been brilliantly dealt with by Dr. Ormerod in his recent lectures; and I refer to it at the present moment only as another illustration of the tendency of the scientists of to-day to look in other directions than that of reflex action. Thus it comes about that the study of vasomotor physiology, though the eldest member of the family, has become its Cinderella, and has been pushed aside by her two flaunting sisters, Chemistry and Psychology. And yet I hope that it may still be possible to extract some interest from her company if you will bear with me for a short time.

In reading again the classic thesis which at the same time laid the foundation of our knowledge of the vasomotor neuroses and established Raynaud's disease as the primordial type of vasomotor disturbance, it is curious to note how far we have travelled from Raynaud's standpoint in one sense and how near we stand to it in another. One is inclined to forget that with Raynaud, as Barlow points out, it was the element of gangrene that held the stage, that the discovery to which he laid claim was that certain forms of gangrene which were otherwise inexplicable might be explained by temporary variations in the calibre of the vessels due presumably to nervous causes. He recognised just as clearly as we do the arterial spasm that underlay the obvious tissue changes. Moreover, the fact was as clear to him as it is to us that this condition of spasm was not limited to superficial vessels, but might affect remote or deep-seated ones, such, for example, as those of the brain with hemiplegia as a result. He placed on record more than one case in which contraction of the central artery of the retina was a matter of direct observation. He clearly enunciated the view that, in some cases, at all events, the disturbance was central, whether cerebral or spinal; and he repeatedly refers to the association between these vasomotor troubles and neurosis or hysteria. There is little, indeed, that we can add to the breadth of his views in some respects. But, when all is said and done, his touchstone was the presence of gangrene, and almost any form of it carried admission as of right to his thesis. From this it arises that a good proportion of his cases and of those of his successors are examples of local disease of vessels, while others are the reflex results of organic disease of the central nervous system, and in either event they have no place among the neuroses. It is curious to read through Raynaud's brilliant treatise, and find such cases as these commingled with others

in which the vivid description brings before our eyes the picture of what is obviously a central neurosis, and yet both included in a common class. Even at the present day there is a good deal of the same confusion in practice, if not in thought, for every abnormal vascular reaction is called a vasomotor neurosis. It is quite true that the vasomotor neuroses contribute so large a proportion of the pathological vascular reactions that in the absence of evidence to the contrary their presence may almost be assumed in practice, but the distinction should always be kept clear in theory.

There is another important respect in which Raynaud's point of view fails to correspond to the conception of a vascular reaction which I am venturing to maintain, and that is in ignoring the exudative factor. His vascular reaction is purely vasomotor—i.e., it deals only with changes in the calibre of the vessel. It must be owned that even now not much more than lip service is paid to exudation as a potentially independent element in the reaction. In the text-books the trophoedemas are certainly treated in an adjacent chapter to, and perhaps even under, the same general heading as the vasomotor neuroses; but nothing is done to establish the existence of any real connexion between them.

The third element which enters into the constitution of what I am calling a vascular reaction is the trophic; but to this, for reasons of time, I can make only a passing reference. It may take a productive form, such as sclerodermia, or a destructive one, such as atrophy or gangrene; but whether the disturbance of nutrition is to be considered as independent of or merely a resultant of the vasomotor and exudative factors combined must be left undecided.

A vascular reaction with its three component parts—vasomotor, exudative, and trophic—may originate at various levels of the nervous system; it may occur as a simple reflex, as the result of direct irritation, or as a symptom in a central neurosis. It may appear in various clinical types, which, however, are not characteristic of an origin at any particular level, though some of them have what may be called predilections. Thus erythromelalgia, and still more, claudicatio intermittens, though also occurring as local aspects of true central neuroses, are specially associated with organic disease of the vessel wall. The symptoms may precede by years any evidence of arterial occlusion or even thickening, in fact, it is more than probable that the long-continued vasomotor excitability may be its actual cause, but this result does ultimately occur in such a considerable proportion of cases that we are

justified in linking them together as belonging to a lowest level type. Of this nature, too, are the cases of Raynaud's disease on a syphilitic basis and cured by specific treatment, which are by no means uncommon. It is not possible to specify with certainty the structures in the vessel which are primarily affected, nor is it necessary for the purpose of the argument.

The middle level type will include all vascular reactions which are due to anatomical lesions in the nervous system above the vessel wall, but excluding the vasomotor neuroses. A good example is given in Fagge's and Pye-Smith's "*Medicine*": "The patient was a girl, aged 26, who was originally admitted in the summer of 1866 into one of the surgical wards under Mr. Cooper Forster for a defective state of the circulation in the fingers, which were blue, cold, and shrunken, and also very painful and tender. At the autopsy, obtained nearly a year later, it was found that a growth infiltrated the fibrous tissue in front of the spine, and involved both the first dorsal nerve and the sympathetic trunk."

The following case might be described as a peripheral neuritis of vasomotor fibres, though the temperament of the patient was suggestive of a neurosis:—

*Case I.*—Miss R., a lady, aged from 35 to 40, suffered much ill-health in connexion with a septic infection of which the exact origin was obscure. In the course of this she developed a spreading thrombosis, which affected most of the superficial veins and probably some of the deep ones. These special symptoms had subsided, but had left her in a state of great misery owing to an extremely painful affection which involved the peripheral segments of all four limbs. The patient was found propped up in bed, with her arms swathed in cotton-wool, and supported by piles of pillows. The condition of the legs was similar, and they had to be protected from the weight of the bedclothes. The pain was persistent, but violent exacerbations occurred with the slightest attempt at movement, either active or passive, and still more with any change of temperature. There was also marked hyperæsthesia, both superficial and deep, but no anaesthesia and no muscular paralysis. The backs of the hands were of a dead-white colour, the skin being abnormally smooth and structureless. The wasting was another notable feature which affected all the structures of the hand, but particularly the finger pulps; these had practically disappeared, and this fact, together with the flexion at all the finger-joints and the incurved nails, gave a curious claw-like appearance to the extremity. The joints were free from change, and though the patient experienced much pain when the fingers were straightened out, it was part of the general hyperæsthesia, and was not referred to the joints. There were no signs of disease in the central nervous system, and both heart and vessels appeared to be healthy. The



symptoms persisted for many months, and then, after some relapses, gradually cleared up. As regards diagnosis, there was a marked superficial resemblance to a peripheral neuritis, but throughout there was never any sign of interference with either motor or sensory cerebrospinal tracts. The condition must have been limited to the vasomotor system, and might be looked upon as a polyneuritis of vasomotor fibres, such as has been described by Bury and others. It was clearly initiated by the spreading venous thrombosis, or both thrombosis and neuritis might be attributed to sepsis as a common cause.

The following case is remarkable in several ways. Though there is much about it that is strongly suggestive of a vasomotor neurosis, yet the extensor plantar response shows that it is dependent upon organic change in the central nervous system, and its insidious progress goes far to confirm this. Clinically it closely resembles Weir-Mitchell's cases of "glossy skin," a condition which is very definitely the product of gross nerve irritation. I give it, therefore, as an example of the "middle level" type, a vasomotor spinal affection analogous to the peripheral neuritis above mentioned.

Miss B., aged 49, is a lady whose illness began thirteen years ago with a feeling of pins and needles with numbness in the feet and legs. From an early stage the change in the texture of the skin on the feet was noticed. The beginning of the illness seems to have dated from an emotional disturbance—the death of a dear friend—and every year at about the anniversary there is a distinct exacerbation of symptoms. The patient has always been of an emotional, æsthetic temperament, but there is no history of any definite ailment. The chief symptom has been pain referred to the feet and the legs below the knees, but not limited to them. Especially of late there has been a great deal of pain referred to the back which is very severe and keeps her awake at night. Warmth is necessary for her, but she is very intolerant of anything approaching stuffiness in a room, and heat applied as by a hot bottle increases her misery. Until the last two or three months patient has been able to get about the room but with the greatest difficulty, walking very painfully and slowly with the trunk bent forward and the knees bent; since then she has been confined to her bed, though she spends a great part of her time not in it but sitting on it with her feet on the floor. Her condition when in bed is one of the greatest discomfort on account of the contractures at hips and knees. It is increased, too, by the constant jumping up of the limbs.

On examination : General nutrition is very good. Patient answers questions about herself readily and without apparent exaggeration. She is sitting on the edge of the bed with the lower half of her body and her lower limbs in such a state of rigidity that she has to be lifted in and out of bed like a wooden image. The spine is held somewhat stiffly in a kyphotic curve, but movements can be elicited in it, and the rigidity does not suggest organic disease. There is some diffuse tenderness on percussion, and one concentrated point in the



lower dorsal region where pressure seems to be acutely painful. From the level of the seventh spinal segment downwards the skin is highly sensitive to touch, but, so far as the trunk is concerned, is not otherwise abnormal. The upper limbs are normal in every way. Both thighs and legs are maintained in a position of flexion and extreme adduction, and all attempts to alter this excite manifestations of pain. The thighs are thin, but certainly not emaciated. There is some œdema about the ankles and lower part of the legs which makes it difficult to say if the leg muscles are wasted or not. The skin over the legs is very dry and hairless. Over the dorsum of each foot it is thin and shiny with a parchment-like texture, while the colour is a bluish-red. Over the toes and the margins of the feet the skin, instead of being thinned, is notably thickened with heaped-up epidermis almost like psoriasis. The nails also are thick and opaque. The skin over the sole is much like that on the dorsum, but the condition is less marked. To the hand the limb feels warm. The skin over the feet is intensely sensitive to touch, and any form of contact seems to be translated into pain. Gentle scratching of the sole to elicit Babinski's sign is described as "tearing of the flesh." The patient maintains that it is something quite different from tenderness; the pain to her seems to start from the inside of the foot, from the bones almost, rather than from the skin. It is noteworthy that she does not make efforts to withdraw the foot, such as one is accustomed to see in hysterical subjects. The vasomotor condition of the foot does not seem to be governed to any great extent by its position, and, as has been stated, the patient habitually adopts a sitting attitude. She does not notice that there is any increase of the pain when the foot is dependent. The deep reflexes are brisk, even exaggerated, but no cloni are obtained. On the left side the Babinski response is uniformly and typically extensor. I am told by the medical attendant that on the right side also he often obtains an extensor response, but I failed to do so. There is no tenderness of nerve trunks, no paralysis, and no affection of sensation except as above described. The central nervous system shows no signs of disease. The pupils are equal and active, and there is no nystagmus. There is no hint of vertigo; the speech is normal, and sphincters uninvolved. From time to time there have been rises of temperature, but at present this is normal.

The condition at the present time is almost perfectly symmetrical, but the changes in the left leg and foot are said to have long antedated those in the right. The present state of the skin has been noted from an early stage of the malady, thirteen years ago. The patient has been treated with some benefit with thyroid extract, which seemed to diminish the dryness of skin.

If we now leave the consideration of the vasomotor element in the vascular response and pass to that of œdema as another aspect of the reaction, we are confronted by both difficulty and doubt. Whereas vasomotor reactions formed one of the earliest and most tempting subjects for physiological research, and for something like half a century have been established as firmly in the laboratory as at the

bedside, the causation of œdema—or, in physiological language, lymph formation—early became the subject of acute controversy which even yet has hardly died away. It was found impossible in the laboratory to confirm observations made at the bedside, and these latter were involved in so many complicating conditions that, without experimental support, they long failed to carry conviction. The leading physiologists in this country—I believe that I am correct in saying this—still regard the theory of nervous intervention as an unproven hypothesis, and one which is unnecessary to explain the facts observed in the laboratory. In spite of this, however, the occurrence of œdema as a consequence of disordered nervous action is now widely accepted on a basis of clinical observation, though the question of the exact mechanism may be left undecided. But the evidence is far more difficult to get than in the case of the vasomotor reactions with which we have been hitherto dealing, and for this there are two main reasons.

In the first place, with few exceptions, these neurotrophic exudations are found in combination with a vasomotor reaction, and it is largely to this association that they owe their apparent rarity, for the exudative element is, so to speak, swamped by the vasomotor and either escapes notice altogether or is regarded as a mere mechanical consequence of the other. It is, as a Mendelian would say, always a recessive. For example, in a case of Raynaud's disease, both elements are often, if not always, present, but it is only the vasomotor one that counts, and if there were nothing in the world besides Raynaud's disease to which to appeal no further analysis would be possible. But there is no such delicate researcher as disease, and we meet not only with cases in which the two constituents are mingled in varying proportions, but with others which occur singly, and to which I shall refer later.

The second reason for the difficulty in identifying an œdema of neurotrophic origin depends upon the extreme sensitiveness of the capillary wall to all kinds of chemical influences, and this sensitiveness can show itself only in the one clinical symptom of œdema. It is not to be supposed that the change in the vessel need be in any way specific, still less limited to any possible powers of response to nervous stimuli, in fact, I think that the subject has been involved in a good deal of unnecessary confusion by the application of the term "angioneurosis" or "angioneurotic œdema" to conditions which there is no ground for connecting with the nervous system. The phenomena of serum disease and of certain idiosyncracies to foods and drugs, to quote

no other examples, may be taken as illustrating the sensitiveness to which reference is being made. The absence of any gross obvious cause for an œdema is certainly not sufficient ground for bringing it under the category of neurotic ailments. There must be some positive evidence for the connexion to justify us in picking out of the thousand and one œdemas of indeterminate chemical origin one which is to be dubbed neurotrophic.

But, before reverting to the discussion of this point, let us see how far the development of the neurotrophic œdemas occurs on parallel lines to those adopted for the vasomotor responses. What we have called the lowest level can hardly be said to exist, at all events not as a recognisable clinical entity, apart from vasomotor changes. Even on the middle level, examples of trophic œdema which it is possible to identify as such are by no means common, for reasons which have already been given, but they are sufficiently numerous to establish the fact of their occurrence, especially as this takes place under conditions closely reminiscent of the corresponding vasomotor symptoms. As one would expect, a considerable proportion of this class of trophic œdemas is contributed by tabes and syringomyelia, though new growths of cord or membranes are occasionally responsible. Herpes zoster, unless it is to be ruled out on account of the associated hyperæmia, furnishes a most instructive type with an assured pathogeny, thanks largely to the researches of Dr. Head. Certain forms of peripheral neuritis (such as beri-beri) are characterised by an œdema for which, apart from the involvement of nerve-fibres, it is difficult to account, though, in view of the coexistent changes in metabolism a chemical explanation cannot be altogether excluded. But, apart from such scattered examples as these with which we are all familiar, the overwhelming majority of trophœdemas occur as elements in a true vasomotor neurosis, a fact, as we shall see presently, of the greatest significance in their causation.

With this we may pass from the simple vascular reactions to consider the part played in the pathology of the vasomotor neuroses by the exudative tendency which is conveniently expressed by the word "œdema." The first point to note about the vasomotor neuroses is that we no longer find ourselves confined to the strict limits of the nervous system, in fact, the differentia as between the vasomotor neurosis and the vascular reaction is to be found in the interposition of the ductless glands. It needs but a cursory inspection of the field to see in how definite a manner the ductless glands become engaged, notably in certain special

forms such as the climacteric neurosis and exophthalmic goitre; in fact, an influence upon the vasomotor system appears to be a common property of these organs. In the case of the adrenals, thanks to the researches of Schaefer, Murray, Elliott, and others, we know that they act by virtue of a single substance of definite chemical constitution which can be synthesised in the laboratory and the injection of which is equivalent to stimulation of the sympathetic. Thus, we fully recognise the fact that vasomotor action—i.e., changes in the calibre of the vessels—may be brought about either by direct nerve action, or by the interposition of a chemical substance, and in either event the activities so induced are still credited to the nervous system. Each individual vasomotor reaction may be considered as divisible into a nervous and a chemical or chemico-nervous component; as Dr. T. R. Elliott has put it—I do not give his exact words—impulses by the sympathetic provide the tension of the string, while those which travel by cerebro-spinal fibres supply the tune. It is a co-operation which may be compared with that between the cerebrum and cerebellum.

What I would now like to suggest is that a similar influence is exerted by the ductless glands or their products—adrenalin for example—upon the exchange of fluid through the vessel walls. Experimental evidence on this point is highly desirable, but, just as with the analogous case of direct nerve action as a cause of oedema, it is extremely difficult to obtain. There is some, as in a recent research by Gradinescu,<sup>1</sup> from which the view gains support that adrenalin exerts control over the exudative as well as over the vasomotor function. He finds that removal of the adrenals causes disturbance of the permeability of the capillaries, so that the blood plasma escapes into the interstitial tissues and serous cavities to such an extent that the blood may rapidly lose half its volume. But in the main we have to rely upon clinical evidence to prove that oedemas which we meet with in the vasomotor neurosis, even though they may confessedly take their origin in the chemical processes of the body, should still be classed as neuropathic. The argument would be based upon the constantly observed parallelism between the vasomotor phenomena of which we know much, and the exudative phenomena of which we know little. As neuropathic symptoms they stand or fall together, and it may be asserted that it is not possible to study the evidence by the bedside or in clinical records without being convinced that if the vasomotor symptoms are neuropathic so also must be the exudative. By a

<sup>1</sup> Gradinescu, *Pflüger's Archiv f. d. ges. Physiol.*, Bonn, 1913, clii, p. 250.

curious coincidence, in the course of one week I saw two youths each of whom had suffered a trivial injury to the foot; in the one case the result was a perfectly typical vasomotor neurosis of the local asphyxia class, while in the other an equally typical trophædema developed which lasted for months and in which vasomotor phenomena were conspicuous by their absence. Or again, take a series of cases reported in an interesting paper by Dr. Edgeworth, under the title "Hysterical (Edema),"<sup>1</sup> and which become all the more significant as they are published from an entirely different point of view. Incidentally it may be remarked that with regard to most of Dr. Edgeworth's cases there seems no shadow of ground for calling them hysterical, but in showing the gradation from pure exudative to vasomotor phenomena they provide a striking demonstration of the real identity of the two types of vasomotor neurosis.

It comes to this, then, that if we are to exclude the trophædemas from the sphere of the neuroses we must also exclude the vasomotor neurosis itself and this would be an affront to all our practical experience. If we limit our gaze to the individual we may quite possibly remain in doubt, but not if we extend our view to other members of the family and to the ancestry. It is not necessary to multiply instances, but the well-known Werrell family may be cited as a good example of the strongly marked neuropathic heredity which is present so constantly in the trophædemas, however free from taint the individual may appear to be.

One is tempted to ask in what proportions the vasomotor and exudative phenomena contribute to the symptomatology of the vasomotor neurosis, but the question is a very difficult one to answer. The dominant character of the vasomotor element will always tend unduly to suppress recognition of the exudative, but in our present state of knowledge this is inevitable. In megrim and its morbid associates, with which the brilliant pen of Gowers has familiarised us, there is a tendency to assume the presence of arterial spasm, with which œdema is less likely to be associated than with spasm, but megrim with dilated vessels—if outward appearances are any criterion—is by no means infrequent, and cases are occasionally met with which strongly suggest the origin of cerebral symptoms in œdema, of which the following is an example:—

A young lady took a short railway journey to visit some friends in the country and started in good health. She arrived at the station to which

<sup>1</sup> *Quart. Journ. Med.*, Oxford, 1909, ii, p. 135.



she was destined, and got out; but no sooner was she on the platform than she suddenly fell into what Gowers would call a dream-state; her surroundings became unfamiliar to her, and when the porter came up to her she could not tell him if she had got any luggage or where she wanted to go. There was no suspicion of even a momentary lapse of consciousness or of bodily illness. She recovered her orientation in a few minutes or less and joined her friends without making any reference to the circumstance. During the evening of the same day she was sitting with her hostess doing some needlework, when she suddenly found that she could no longer see it, though her sight was as good as ever when she looked up. Just as she was making this observation her friend who was sitting opposite to her uttered an exclamation at her appearance. In consequence of this she examined herself in the glass, and then to her astonishment found the tissues round each eye swollen to such an extent as completely to obstruct the view in a downward direction. By the next morning the swelling had entirely disappeared and there were no further developments. She is a member of a family of the highly-strung vasomotor type, but is certainly not hysterical. It is interesting to note that a sister suffers from spasmodic asthma and a brother a good many years ago had some kind of seizure attended by loss of consciousness, which was attributed at the time to vasomotor spasm and not to epilepsy. There seems to be fair ground for believing that a local oedema played the same part in the sister's symptoms as a vasomotor spasm in the case of the brother, though of course absolute proof is in the nature of things impossible.

Certain visceral affections form an important group of exudative phenomena, the chief members of which are some types of asthma and those cases of intestinal colic which have been so fruitfully studied by Sir W. Osler under the heading of "Angio-neurotic Oedema." At the same time to both of these, but particularly to the latter, it is necessary to apply a stringent criticism before accepting them as in any sense neuropathic, for more often than not they are based upon some alteration of the chemistry of the organism, such, for example, as anaphylaxis. An exudative diathesis is recognised by many foreign observers, but the conception is too wide to be of much value and the term is better avoided.

The physical qualities of the oedema are not characteristic but are determined rather by the density or laxness of the tissues in which it has its seat. Not long ago I showed before this Section a girl with functional hemiplegia who had a persistent hard oedema of the hand and forearm on the paralysed side with commencing sclerodermia; at the same time she had an evanescent but recurrent soft oedema of the Quinke type which appeared about the eyes and fauces,



and in addition to this there were repeated attacks of abdominal pain which one could only attribute to a similar process in the alimentary canal. All the symptoms cleared up gradually under treatment and the patient was able ultimately to walk out of the hospital.

If we attempt to look at the vasomotor neurosis as a whole, apart from the local and intermittent symptoms, it must be owned that it is a very intangible thing. There are an infinite number of symptoms, some of which are quite obviously vasomotor or exudative, while at the nature of the others we can arrive only by a process of induction. What is the strand which binds them together, which, so to speak, strings the beads into a necklace? It is difficult to imagine that the vasomotor system is in a normal condition between the attacks, in fact there are many minor symptoms which prove that it is not. Examine, for example, a patient with dermatographia, some degree of which is so often present. The mere exposure of the chest brings out a vivid blush and the application of a trivial stimulus will elicit all degrees of vasomotor and exudative phenomena up to giant urticaria. Or there is a history of chilblains, of habitual dead fingers at breakfast time, or of inability to bathe, or even to have a cold bath without prolonged discomfort to follow. It may be argued that all this amounts to little more than temperament, but it forms the taking-off ground for the whole string of vasomotor symptoms, and it has been the investigation by means of the plethysmograph of these comparatively quiescent periods that has of late proved so fruitful. As was only natural, the earlier observers attacked the problem in its most advanced stages of local syncope and asphyxia, and, partly from the imperfections of their apparatus, but much more from the moment which they chose for their investigation, their efforts ended in relative failure. It could not be otherwise since, under the conditions which they had chosen, vasomotor reactions are practically abolished.

In bringing before you some more recent results which we owe to Dr. Arthur Simons,<sup>1</sup> of Freiburg, and others to which I shall refer later, I will make no apology for their source—"fas est et ab hoste doceri" is as true now as ever—but I will beg the patience of those to whom they are already familiar. A graphic record of variations in the bulk of the limb was obtained by means of Mosso's plethysmograph improved by Lehmann, the limb being inserted into an indiarubber glove and so not coming into contact with the fluid in the instrument.

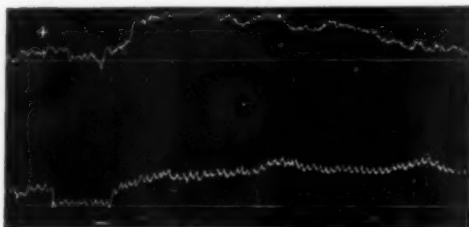
<sup>1</sup> Arthur Simons, *Archiv f. Physiol.*, 1910, Suppl., p. 429.

But, as I have just explained, the chief innovation consisted in the observations being made, not during the paroxysm but in a quiescent period, and in this way Simons was able to demonstrate a very remark-

## RAYNAUD'S DISEASE.

Volume curve of  
right arm

Volume curve of  
left arm

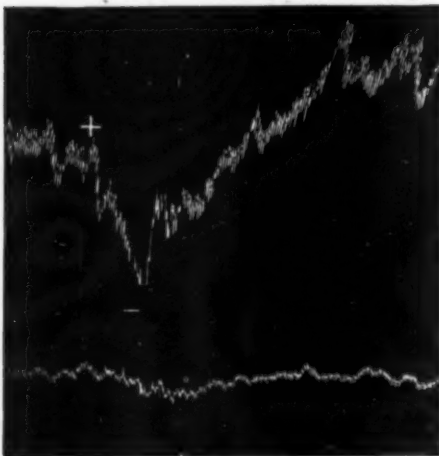


TRACING 1.

At +, stimulation with acetic acid; at -, neutralisation.

Volume curve of  
right arm

Volume curve of  
left arm



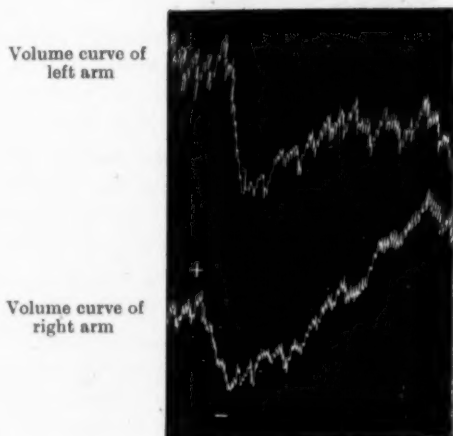
TRACING 2.

The same case. From + to -, ice applied to mid-line of forehead.

able dislocation of vasomotor relations. A simultaneous record was taken of both limbs and also of the respiratory movements—a very necessary precaution in view of the delicacy of these reactions. The usual test which he applied was the application of ice to the mid-line

of the forehead. In a normal subject this of course would bring about a general contraction of the peripheral vessels and a drop in the sphygmographic tracing with a rise to the original level on the cessation of the stimulus. Occasionally, instead of the ice test, a drop of acetic acid was placed on the tongue and the stimulus arrested by its neutralisation by an alkali. This form of stimulus has a similar effect on the peripheral circulation, but does not strike one as nearly so satisfactory, since it may be complicated by an emotional element of pleasure or pain. The accompanying tracings are selected from a large number given by Dr. Simons:—

- (1) The first is from a case of Raynaud's disease—of course during



TRACING 3.

Ice applied to forehead from + to -.

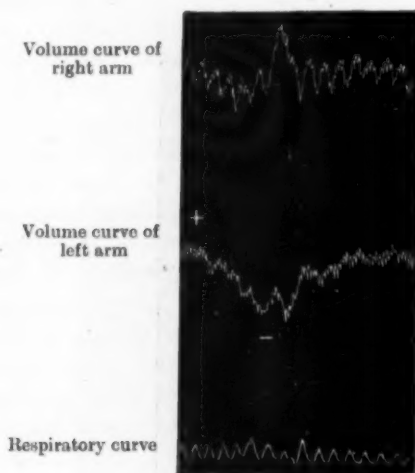
a quiescent period—and shows the result of the application of acetic acid to the tongue at + followed by neutralisation at -. On the right side the initial drop which constitutes a normal reaction does not appear at all, while on the left it is very slight, and on neutralisation there is a very considerable rebound on both sides to a level markedly higher than the original.

- (2) The next tracing shows the effect in the same case on another occasion of the application of ice to the forehead. On the left side there is no reaction; on the right there is an exaggeration of the normal

drop with the application of the stimulus and an exaggerated rebound with its cessation.

(3) The succeeding tracing shows a marked initial drop, but one which is not synchronous on the two sides, the subsequent rise falls short of the original level on the left side and rises high above it on the right (*see p. 15*).

(4) The last tracing shows a normal response on the left side, while on the right the reaction is actually inverted—there is a rise where there should be a fall.



TRACING 4.

Ice applied to forehead from + to -.

Caution is necessary in drawing conclusions from these observations, interesting though they are. The tracings are selected out of a long series and, as Simons himself says, widely different results may be obtained within a few hours from the same patient. It is clear that in one sense no coherent structure can be built upon them. It is not possible to say that such and such a tracing connotes a case of erythromelalgia, or such an one a case of local asphyxia; but taken together they do show very clearly a disorganisation of reflexes. A stimulus applied centrally produces a reflex on one side of the body and not on the other, or the reflex may occur but not to the same extent, and not

quite synchronously, or it may occur in the opposite sense on the two sides. The condition is quite certainly a disorder of function only, for in these very cases perfectly normal reactions may be obtained from time to time, and as the symptoms have been present in most of the cases over long periods the presumption is strong that we have to do with a true disorder of nervous reflexes and not with an early stage of vascular disease. In looking at these strikingly abnormal records one's first feeling is perhaps one of surprise that such gross disturbance should not involve more definite interference with function, until one remembers how wide a precautionary margin against failure Nature is in the habit of leaving. There is some danger that one may exaggerate the part played by the nervous element when the attention is concentrated upon that aspect of a vasomotor reaction. We know that the inflammatory process, for example, may be carried through with a fair success under favourable conditions after the elimination of nervous impulses, but when the conditions are not so favourable the margin of safety has been sacrificed, and the result may be death of the tissues concerned instead of recovery. One would expect, therefore, such failure of function as would be the consequence of these disorders to take the form of an unduly early fatigue, of a tendency to break down under any prolonged stress and to experience under many conditions subjective sensations of discomfort. Professor Weber, in his remarkable book, "*The Influence of Psychical Processes on the Body*," gives a series of plethysmographic records showing in very vivid fashion the appearance of precisely analogous reflex disorders produced in healthy subjects by fatigue. From these records we learn that the curious inverted reaction which can be seen in some of Simons's tracings is not a mere accident depending on a vasomotor ataxy, as might well be supposed, but forms part of a definite sequence of changes beginning in the early stages of fatigue with diminution of reaction, then disappearance, and, finally, the inversion in question. The explanation is by no means easy. Weber suggests that one part of the vasomotor centre is responsible for constricting impulses and that when, in consequence of fatigue, this ceases to function, the stimuli pass on to the corresponding dilating centre which is still fresh. I do not know that this is altogether convincing, but the fact remains, whether we accept the explanation or not, and there is a parallel in Bayliss's observation of an inverted response to depressor nerve stimuli in strychnine poisoning. Many other points of interest arise in connexion with these plethysmographic tracings. One is that in normal subjects physical

and mental exertion have similar effect in the production of fatigue; another is that the signs of exhaustion do not show themselves as a result of pleasurable or painful impressions. Another of Weber's experiments showed that alternate applications of heat and cold to a limb with the idea of producing local exhaustion of the vasomotor machinery had no such effect. That limb was able to function as well as its untreated fellow immediately afterwards when called upon to respond to central stimuli.

So far only peripheral symptoms have been taken into account, which may be explained, so far as nerve impulses are in question, by a disorder of the medullary vasomotor centre; but there are others which are strongly suggestive of a similar disorder of the circulation in the brain itself, and as to which Simons's results, interesting though they are, give us no help. Of all organs in the body the brain is the one which we would expect to find provided with the most perfect vascular equipment, and its vessels are actually possessed of nerves which are acknowledged to be vasomotor in character. And yet the most elaborate researches at the hands of our leading physiologists—and amongst these I may mention such names as Roy and Sherrington, Bayliss and Hill—have failed to find evidence that vasomotor action plays anything more than a subordinate part, if that, in the regulation of the cerebral blood supply. Hill sums up the position thus:<sup>1</sup> "Some fairly strong evidence, therefore, has been obtained that the cerebral arteries are constricted by suprarenal extract, &c., like other arteries (with the exception of the pulmonary), and some positive evidence of the existence of vasomotor nerves in the sheaths of the arteries supplying the circle of Willis; but, as in almost every experimental condition, the cerebral circulation passively follows the changes in the general aortic and vena cava pressures, their power must be comparatively insignificant."

But this somewhat grudging admission of the existence of a cerebral vasomotor system and the humble part which is allotted to it falls very far short of what clinical observations would appear to demand. Take, for example, the phenomena of megrim, with which some even of my audience may be familiar in their own persons, the association of attacks of Raynaud's disease with transient hemiplegia, as in Sir W. Osler's case, or the symptoms of ophthalmoplegic megrim as illustrated in the following case which came under my observation some years ago:—

<sup>1</sup> Allbutt and Rolleston's "System of Medicine," viii, p. 2.



The patient had been liable all his life to attacks of megrim of the ordinary type and had his first attack of migrainous ophthalmoplegia nearly thirty years ago. These attacks were repeated with the accompaniment of severe headache at long intervals, the sixth, seventh and twelfth cranial nerves being in turn the seat of temporary paralysis, first on the one side and then on the other. The headache on these occasions was unusually severe and lasted with vomiting for as much as forty-eight hours. It is now some seven years since I saw the patient, who was then suffering from the remains of one of these attacks and, when last heard of less than twelve months ago, he was still a hale, vigorous man, free from any symptoms and able to go out shooting.

To compare megrim with epilepsy is no explanation; no analogies between megrim and epilepsy can ring true so long as lifelong suffering from the one is compatible with the highest level of psychical life, while the other even reduced to its simplest elements brings with it inevitable mental decay.

The syncopic attacks which are not uncommon in the vasomotor neuroses may well be the expression of a similar cerebral storm to that of megrim, but on a wider scale. Dr. A. E. Russell, in his most interesting Goulstonian lectures, to which I am much indebted, adopts the explanation of their production by a sudden relaxation of the splanchnic floodgates with consequent cerebral anæmia. But this is not altogether convincing. There is no doubt that such a form of syncope may and does occur, but in the cases now under consideration there is little or nothing to suggest it. The patients are not the neurasthenics with whom one does associate what might be called a splanchnic debility, but rather of the high-strung, energetic type with marked tendency to local vasomotor troubles. The mere fact that these syncopic attacks occur mainly in the young and otherwise healthy is strongly against the splanchnic theory. On the whole, granted only that there is such a thing, a storm in the cerebral vasomotor centre would afford the most natural explanation of the phenomena.

Holding these views, it will be understood with what interest I read in Professor Weber's book to which I have already referred, an account of researches, mainly plethysmographic, which seek to establish the existence of an independent vasomotor centre for the cerebral circulation. One at once asks how he has been able to obtain positive results while so many distinguished observers have failed. Increased delicacy of apparatus may have had something to do with it, but Weber himself attributes his success mainly to his having taken the precaution of eliminating the action of the medullary centre by means of a preliminary

section of the cervical cord; in many observations he took the additional precaution of destroying the medullary centre itself. The apparatus—so far as he used the plethysmograph—was the same as that used by Simons, while for experiments on the brain he used Roy's oncometer. In his fundamental observation Weber is in harmony with previous observers; he finds that the cerebral vessels are independent of the medullary vasomotor centre, inasmuch as, alone of all the vessels in the body, they give no response to stimulation of the depressor nerve except a passive one depending on the general change in pressure, and he draws the conclusion from this that either they are not capable of vasomotor action or, if they have vasomotor nerves, they must be governed by a separate centre independent of that in the medulla.

Time will not admit of going into the mass of Weber's experimental work in detail, and I must limit myself to giving the broad results upon which he relies to justify his claim to have established experimentally the existence of a vasomotor centre situated on the cerebral side of the medulla with control over the cerebral circulation. These are as follows:—

(1) The increase in volume of the brain which takes place on stimulation of the cervical sympathetic in front of the stellate ganglion, the medullary vasomotor centre having been previously destroyed and all true sympathetic action eliminated by nicotine. The action must be reflex, so Weber maintains, started in afferent fibres which run in the sympathetic trunk.

(2) The increase in volume of the brain which takes place in stimulation of the proximal end of the divided cervical cord. This increase cannot be due to a passive distension of the cerebral vessels in consequence of a general constriction of the circulation by way of the medullary centre, for the medullary centre is isolated by the division of the cord, and the increase in volume must therefore indicate an active dilatation of the vessels in the brain, a conclusion which is confirmed by the change in the pulse volume which accompanies it.

(3) The medullary vasomotor centre having been destroyed, stimulation of the cerebral cortex produces a dilatation of the vessels in both hemispheres alike, a result which must be due to reflex action through some other centre than that in the medulla.

In shortest summary, these are the grounds upon which Weber supports his thesis. There are various minor ones, such, for example, as a reaction of the cerebral vessels to drugs, particularly those of the antipyrin class, which differs from that of the rest of the circulation,

but the case rests mainly on the three observations mentioned above. He has attempted to ascertain the exact site of this hypothetical centre, looking, as one would expect, in the optic thalamus or its immediate vicinity, but so far without success. The existence of a higher centre than that in the medulla has been advocated on other grounds and the presumption in its favour must be considerably strengthened by this work of Weber's, though, until these results have surmounted the criticism of other physiologists, they cannot be accepted as final. In the meanwhile to the clinician they are most attractive. Some observations of Weber's show that we are justified in assuming that the vasomotor system in the brain is the seat of processes which are strictly comparable with those observed at the periphery. The subject of these investigations was a boy, with a defect in his skull, from an old trauma, which made it possible to take a direct record of variations in the bulk of the brain, and the tests applied consisted (amongst others) of some kind of mental work. Precisely the same phenomena were observed in the brain as have been described at the periphery. If the subject was fresh and had slept well the normal expansion of the brain which should occur under the circumstances took place, but as fatigue set in this expansion grew less and less and finally disappeared, or was even replaced by a contraction. Citron (under Weber's inspiration) extended these observations to many cases of disease, mostly of a functional character, such as neurasthenia, Graves's disease, and others, and found that these reactions of fatigue occurred with undue readiness or might even be a permanent feature. In these cases it was not, of course, possible to make direct observations of the brain as in Weber's boy, but with the experience gained of the close correlation between the central and peripheral reactions, this was no longer absolutely necessary and the records taken were those of the arm. It should be remembered, however, that the testing of these psychical reactions involves much more complicated processes than the simple thermal test—a piece of ice applied to the forehead—employed by Simons. For one thing, as Weber himself points out, it introduces the important element of concentrated attention, and it is quite possible that this may be the determining factor even in some forms of physical as well as mental exertion. Still, this need not concern us here, as all that we are considering is the character of the reaction, and not the exact nature of the stimulus which calls it forth.

Time allows of little more than a perfunctory reference to the psychical or temperamental aspects of the vasomotor neuroses. We find ourselves

here in a region with ill-defined borders or even without borders at all, a sin for which the usual penalty of absorption by neighbouring territories has been paid. There is no department of medicine in which heredity plays a more important rôle, where physiology melts more imperceptibly into pathology, or where the line is more difficult to draw between temperament and disease. Even if we do not go as far as Eppinger, Hess, and their colleagues, and divide the whole world into vagotonics and sympathicotomics in the manner of Gilbert's rhyme, "And every man is born alive a Liberal or Conservative," we shall recognise certain vasomotor types. The most striking of these may be sketched somewhat as follows. The subject is commonly but by no means always a female and a member of a highly strung family. On the bodily side there are well-marked signs of vasomotor instability, such as the bright but rapidly changing colour in the cheeks, with some degree of dermatographia over the covered parts of the body. The hands and feet are habitually cold and often cyanotic—the patient probably has a hot-water bottle in her bed every night of the year. On slight provocation the action of the heart increases greatly in rate, and of this the patient is acutely conscious. Syncopic attacks are frequent and may be precipitated by a close atmosphere, as in church, while minor attacks occur in the form of giddiness. The thyroid is full but as a rule is not pathologically enlarged. Constipation of the spastic type is nearly always a constant trouble, and these patients contribute a very considerable contingent to the regiments of mucous colitis. Headaches are frequent but not so often of a migrainous character as might be expected. The local vasomotor condition may be one either of syncope or asphyxia, more commonly the latter. But it is on the psychical side that the temperamental aspect is revealed. The patient is possessed of great but evanescent and ill-regulated energy, periods of activity alternating with others of compulsory rest. The patient lives a vivid emotional life, devoting herself to the pursuit of religion, philanthropy, society, art, or even finding an emotional outlet in the over-assiduous care of husband and children. There is clearly a predominance of the emotional side, but it must always be insisted that, though such a temperament offers a very favourable basis for hysteria, it is not itself hysterical. The instrument of the emotions is given a disproportionate part in the orchestra, and plays it with an excess of emphasis, but it need not be out of tune, and in fact the note may be one of great purity. Some of the finest work in the world is done by the victims of this temperament, and, so far from showing the selfish egotism of hysteria, they may

push the practice of self-sacrifice to the verge of vice. Generally the condition is congenital, but has little more than a tendency to the morbid, the tendency becoming an actuality only at the crises of life such as puberty and the climacteric, when the form of the neuroses receives a particular label in connexion with one or other of the ductless glands.

The other vasomotor type—neurasthenia—offers a curious contrast to the one just alluded to rather than described. Instead of misguided energy rapidly exhausting itself we find a permanent condition of fatigue which makes any thought of activity either of mind or body hateful. All the processes of life, even those which should remain below the threshold of consciousness, become unpleasant or painful, and so we have symptoms referred to every one of the bodily systems. In neurasthenia there is very little tendency to develop local vasomotor symptoms, but there is nearly always a general peripheral cyanosis which leads to cold and clammy hands and feet. It has been argued with much plausibility that the key to many of the symptoms in neurasthenia is to be found in a functional disorder of the splanchnic vasomotor system, and similarly one might venture on the hypothesis that in the contrasting vasomotor type there may be a state of irritable weakness of the higher vasomotor centres, but it would be rash indeed, in the present state of our knowledge, if one were to attempt to bring any particular group of symptoms into connexion with some one form of vascular disturbance. Still the evidence in favour of the existence of an active cerebral vasomotor system arouses hopes that further research in this direction may one day throw light into some of the dark places of functional affections. The cerebral vasomotor mechanism may be pictured as an instrument which is played upon by the ductless glands on the one side and the central nervous system on the other, but as liable also to develop disorders of its own, and further knowledge of its nature may make it possible to draw a clear distinction between a primary vasomotor neurosis on the one hand and a neurosis originating at a higher level but accompanied by vasomotor symptoms, as epiphenomena, on the other.

In the course of this paper I have attempted to show the occurrence of vasomotor symptom-complexes at different levels of the nervous system, and to these it seems that one should be added from the brain itself. In a monograph of remarkable interest with the unfortunate title "*Hysterical Paralysis*," Dr. Gaspero gives a detailed study of three cases, on the basis of which he constructs a new symptom-



complex, to which he gives the name of vaso-vegetative paralysis. The cases are of an exceedingly complicated description, and time allows only of a short résumé. The first was a man, aged 31, with a history of epilepsy in the mother and one sister. As a boy he was in a reformatory school, but no physical incident is recorded till he was aged about 20, when he fell 30 ft. on to his head. A month after this he began to have fits, which have continued at intervals ever since. For the past ten years he has been a drunkard, and has lived a vagrant life, with occasional attacks of alcoholic delirium. About six years ago he noticed weakness of the right hand after an epileptic attack, and in the course of six months this went on to complete paralysis with a contracture of the hand much like that of tetany. His condition, on examination, was as follows: There was a defect of bone at the upper angle of the occipital from the old trephining; the scar was very tender, but pressure elicited no epileptic seizure. There was no sign of disease in any part of the body except the right arm. This hung from the shoulder completely paralysed and flaccid, except as regards the hand already mentioned. There was very slight wasting, but no change in the skin. The reflexes were normal. Sensation of every kind was completely abolished in the limb up to a sharp line, which would correspond to an amputation at the shoulder; to this general anaesthesia there was one exception in a small oval area in front, and another on the posterior aspect of the elbow where there was hyperaesthesia. The patient was absolutely unaware of the position of the limb, which hung on to his shoulder as a foreign body, in which he took very little interest. During the fits the limb remained unaffected by the convulsions which were otherwise general. In short, the condition of the limb was such as is associated with "functional" diseases. An examination of the vasomotor condition by plethysmographic methods gave the following results: In the paralysed right upper limb all reactions were present, but markedly diminished as compared with those of its fellow on the opposite side; and this was the case with thermal tests, with adrenalin and amyl nitrite. Gaspero suggests that the condition is one of spastic rigidity of the local vasomotor system, which is such as the tests applied were inadequate to overcome. In support of this theory are the facts that the limb was persistently of a lower temperature, and that the blood-pressure was always about 15 mm. of mercury lower on that side than on the other. The form of the pulse tracing, too, was in conformity with this. But the most striking change was with regard to psychical tests, and specially to those



consisting in suggestions of movement. To these the failure of response was complete, and would seem to be due, as Gaspero suggests, to a complete rupture of communications between the higher cortical centres and the vasomotor centre.

Gaspero's third case was one of functional hemiplegia and anaesthesia in a chronic alcoholic. The paralysis was neither complete nor persistent, but occurred in the form of attacks of paresis or (as Gaspero calls it) myasthenia. In this case changes in the vasomotor reactions of the same nature as those just described were found to be present during the attacks of myasthenia, and only then: a variation *pari passu* with the clinical symptoms, which is certainly most suggestive. Another interesting feature was the fact that the application of a thermal stimulus to the anaesthetic area gave rise to a normal vasomotor reaction on the healthy side.

Observations on two controls suffering from organic disease are recorded in the same monograph—one a case of hæmorrhagic hemiplegia of ordinary type, the other a very severe, almost complete, lesion of the brachial plexus with muscular atrophy, reaction of degeneration, and so forth. In both these cases—and the observation is a very important one—the vasomotor reactions which were abolished in the “functional” cases were normal.

I have attempted to compress a work which occupies 170 large pages into a few lines, but I think that I have given, however roughly, the grounds upon which Gaspero bases his claim to have established a new symptom-complex—a vaso-vegetative paralysis, as he calls it—which is to hold an independent position by the side of motor and sensory paralyses. He calls it hysteriform rather than hysterical, a modification of title which to some extent disarms criticism; for, though his cases may be called functional, they certainly do not correspond to anything that we understand by hysteria. I should like to claim Gaspero's symptom-complex as the *highest level* vasomotor neurosis.

The time has now come to gather up the threads of the argument which I have been endeavouring to develop. I have urged that a vascular reaction should be considered as made up of at least two components, the one strictly vasomotor, the other exudative. There is a third, the nutritive or trophic element, which to my regret I have had to ignore in deference to the exigencies of time, and, perhaps, your patience. I have referred to the various reasons which have led to the submerging of the exudative element of the complete reaction in the

vasomotor, and have given illustrations of its independent occurrence. Examples have been given of the simple and combined reactions as the result of organic disease at different levels of the nervous system. The vasomotor neuroses were then dealt with and regarded as originating at a level not lower than the medullary vasomotor centre, so far as nerve centres were concerned, but dependent also upon changes in the series of ductless glands, one or other of which might be the actual starting point. That led to a brief review of Simons's demonstration of vasomotor aberrations during the quiescent period of a vasomotor neurosis. A consideration of some of the central symptoms of the vasomotor neuroses opened a discussion as to the existence of a special cerebral vasomotor centre, and a short summary was given of Weber's evidence of the presence of such a centre at a higher level than that in the medulla, and independent of it. Finally, Gaspero's "vaso-vegetative" symptom-complex was described as an example of a vasomotor neurosis dependent apparently upon a dislocation of the connexion between cortical or subcortical levels and vasomotor centres. Higher than that in the way of vasomotor clinical entities we are hardly likely to go, and there I propose to leave the subject.

## Neurological Section.

February 25, 1915.

Dr. H. G. TURNEY, President of the Section, in the Chair.

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### Intrathoracic Tumour ; Trophic Changes in Fingers.

By H. G. TURNEY, M.D.

J. S., AGED 62, female. The patient has always been strong and healthy till two years ago; since then she has been liable to repeated attacks of bronchitis, with chronic cough. She states that about six weeks ago the left hand became blue and swollen, and the seat of severe pain, which became worse at night. The pain was referred mainly to the ulnar border of the hand and little finger. A fortnight later the tip of the little finger became black.

On examination a fortnight ago the distal phalanx of the little finger of the left hand was black, and evidently necrotic. The skin over all the fingers was smooth and shiny, but this change was specially marked over the seat of pain—i.e., the ulnar border of the hand and the little finger—and here there was extreme hyperæsthesia to the lightest touch. The hand as a whole was shrunken, with the exception of the index-finger, which was swollen and congested. Except for the hyperæsthesia there was no affection of sensation, and motor power showed no definite diminution. The central nervous system was quite free from change, and the pupils were equal and active. With regard to the chest, there was some general œdema of the superficial tissues; the veins were full but not notably distended. Movements on the left side somewhat deficient and the percussion note impaired. Inspiration harsh on both sides but more so on the left. An X-ray examination by Dr. Reid showed the presence of an opacity on the right side of the spine merging into the border of the area of cardiac dullness.

**Tumour of Right Cerebello-pontine Angle ; Posterior Decompression in May, 1914 ; Great Improvement.**

By LEONARD GUTHRIE, M.D., and E. G. FEARNSIDES, M.D.

F. M., SINGLE, machinist, aged 26. Until the summer of 1912 the health of this patient was uniformly good. She then noticed that her power of hearing on the right side was failing. In August, 1912, she was admitted to the London Hospital under the care of Dr. Robert Hutchison, complaining of diplopia, intense headache, giddiness, vomiting, and general weakness. At this time she showed paresis of both external recti muscles, nystagmus to right and left, and bilateral pyramidal interference, as shown by the double extensor response and ankle clonus on both sides, but no optic neuritis. Under rest in bed her symptoms improved rapidly, and on discharge in September, 1912, except that she was still subject to attacks of giddiness and her hearing on the right side was defective, she was entirely free from manifestations.

Between October, 1912, and Christmas, 1913, she worked as a machinist. On January 20, 1914, she was suddenly seized with intense occipital headache, which led to vomiting, and in two days this was followed by a feeling of numbness, unsteadiness, weakness and clumsiness of the whole of the left half of the body, double vision, and an interference with speech. She was put to bed and remained there until her admission to the London Hospital on February 6, 1914. At that time she complained of headache, morning vomiting, giddiness, intense and increasing bodily and mental weakness. She was drowsy, dull, and apathetic. The headache was worse in the occipital region and was accompanied by pressure and percussion tenderness of the skull above the mastoid processes. She vomited frequently, usually on waking in the mornings. Speech was grossly affected, *staccato*, and hesitating. The pupils were equal and reacted normally. Both external recti muscles acted feebly and there was intense vertical and lateral nystagmus. The other ocular muscles acted normally. She had difficulty in opening her mouth. The right half of the face, both in its upper and lower portions, was parietic. The tongue was protruded straight and the movements of the palate and larynx were unaffected. She lay curled up in bed with her head bent either towards the right or left shoulder.

All movements with both upper extremities were clumsy and incoordinate. The clumsiness was more noticeable on the left side than on the right. There was no motor paralysis. She was completely unable to stand either with her eyes open or closed. There was some interference over the left half of the body to all forms of sensory testing, but no absolute loss, and passive position and the response to the vibrations of a fork were not more affected than other forms. Over the right half of the face there was some sensory interference. Both knee-jerks were exaggerated and doubtful ankle clonus was obtained on both sides. The left plantar response was definitely extensor in character and the right doubtfully so. The abdominal reflexes were obtained. The action of the bladder was not controlled. Optic neuritis was not present, but hearing on both sides was very defective. Between February 14 and 19, 1914, she wasted and became more and more drowsy. On February 19 the signs were little altered, except that there was now an intense volitional tremor of the right upper extremity and speech was more grossly affected, and that ankle clonus was now only obtained on the right side. At this time, although both plantar responses were extensor, the left was much more definitely so than the right.

On March 26, 1914, she was transferred to the Hospital for Epilepsy and Paralysis, Maida Vale, under the care of Dr. Guthrie. At this time all mental processes were dulled, memory was poor, and attention very defective. She was very emotional. Speech was intensely slow, hesitating, and *staccato*. She vomited several times daily, and headache was extremely severe. Seizures never occurred during the time of observation. The visual fields and optic disks and fundi appeared healthy. The pupils were equal and reacted well both to accommodation and to light. The right external rectus was completely paralysed. Ptosis was not present. Nystagmus was present both to right and to left, but the rate of movement and the amount of excursion was greater to the left than to the right. All movements of the right half of the jaw were defective, and the mandible swung over to the right when the patient attempted to open her mouth. Sensation over the right half of the face and right side of the scalp was impaired. Responses to pain, heat, and cold seemed to be more affected than the recognition and localisation of light touches. Both the upper and lower portions of the right half of the face were paretic. Hearing on both sides was defective. The drums on both sides were thickened and retracted, and both air- and bone-conduction of sounds was impaired; the impairment was much greater on the right side than on the left. The movements of

the palate, of the larynx, and of deglutition were unaffected. The tongue deviated to the right on protrusion and could not be held steadily. Taste on the right half of the tongue was defective. There was no cranial deformity. Percussion over the right mastoid bone elicited the complaint of pain.

She was unable to stand without support. Whilst lying in bed the head was constantly kept rotated towards the right, and the patient complained that she felt as if she were falling laterally, either to right or left. All movements of the left half of the body and extremities were defective in power as compared with those of the right, and all movements of both upper extremities were clumsy and ill directed. The muscular tonus was greater on the left half of the body than on the right. The left leg was spastic and the right inco-ordinate. Involuntary drawing-up movements of both legs were troublesome. Dysdiadokokinesis was well shown by both upper extremities. In testing the hands as to power of touching objects, both hands deviated considerably towards the right; this deviation was increased by closure of the eyes. When crawling, the left shoulder was held at a higher level than the right, and she tended to fall towards the right. When attempting to sit up in bed she usually fell towards the right. Volitional tremors of the right hand were well illustrated.

All sensations received from the left half of the trunk and left extremities were recognised, but were said to be "different" from those obtained on testing the right. Passive position, localisation, shape, size, form, &c., were not more affected than the sensations evoked by the prick of a pin, pressure, heat and cold. The jaw-jerk was obtained. The supinator-, biceps-, triceps-, knee- and ankle-jerks were all greater on the left side than on the right. Ankle clonus was obtained on both sides. On the right side the plantar response was indefinitely extensor, on the left definitely extensor. On the left side abdominal reflexes could not be obtained; on the right they were brisk.

The urine contained a trace of pus but no albumin; frequency was a source of much trouble and occasionally incontinence and retention of urine occurred; cultures from the urine grew *Bacillus coli*. The action of the rectum was controlled.

The Wassermann reaction both in the serum and cerebrospinal fluid was negative, and the cerebrospinal fluid, which was under pressure, contained six cells per cubic millimetre.

No abnormal signs were discovered in the heart, lungs, vessels, or abdomen.



Under observation she grew steadily more and more lethargic, headache and vomiting were exceedingly troublesome symptoms, and by April 17, 1914, early optic neuritic changes in both fundi were seen. The degree of fundal change gradually increased and on May 7, 2d. of swelling in each eye was measured.

On May 13, 1914, Mr. Blundell Bankart operated. A large, bilateral, subtentorial, posterior decompression was performed. A hard, fixed, apparently bony mass was found in the right cerebello-pontine angle. The tumour could not be removed. After the operation all the manifestations began to improve. She remained an in-patient until July, 1914. Since discharge her symptoms have steadily become less, she has gained weight, and at the present time she complains chiefly of defective vision of her right eye, of a permanent squint, and of right-sided deafness and noises on the right side. Since operation she has been entirely free from headache and subjective giddiness and has never vomited. Memory is again fair. She is no longer emotional. She sleeps well and "feels herself."

Lateral nystagmus more rapid and greater towards the right persists. Vision with her right eye is defective, and the axes of the two eyes rarely move together, yet there is no ocular palsy. The right jaw muscles are still weak and the jaw swings to the right when the mouth is opened. On the right side she cannot hear the ticking of a watch, which she readily hears at 18 in. on the left. On the right side the disk shows slight post-neuritic atrophy. The deep reflexes on the right half of the body are exaggerated, on the left normal, but ankle clonus cannot be obtained and both plantar responses are flexor. The action of the sphincters is controlled. There is little difference in the tone of the muscles of the extremities on the two sides, and rotatory movements are now relatively well performed. She walks well and can do the household work at home.

**Syphilis Meningo-vascularis, Congenital Syphilis, Choroiditis,  
Optic Atrophy, Herpes Zoster, Multiple Root Lesions.**

By LEONARD GUTHRIE, M.D., and E. G. FEARNSIDES, M.D.

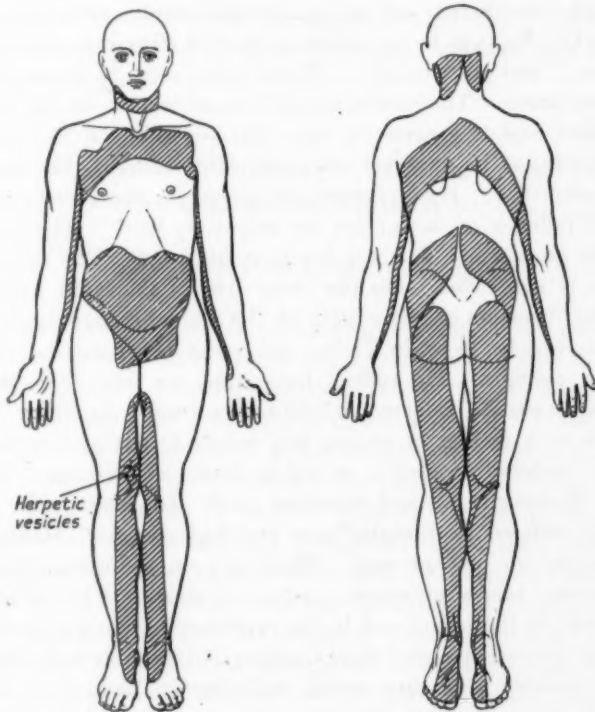
F. T., BORN January, 1903.

**Family history:** The patient's parents were both quite healthy until their marriage in 1894. Early in 1895 a healthy girl was born, who still survives. Shortly after the birth of this child the mother suffered from a chancre on the vulva and from anæmia, but had neither rash nor sore throat. Her second pregnancy ended with the birth of a seven months' peeling child. At her third pregnancy twins were born at term, but both died before they reached the age of 4 months. Her fifth child was a boy who died from "cause unknown" at the age of 9 months. The patient was the sixth child of this marriage. His birth was followed by the birth of a premature child, of a girl now aged 9, of three miscarriages, and of a girl now aged 5.

**Personal history:** At birth the patient was a small child; as a baby he suffered from wasting. He walked and talked at the usual time, and as a baby only suffered from children's complaints. By the age of 11 he had reached Standard IV. About May, 1914, he "began to go wrong." He complained of sick headaches, general weakness, pains in his body and limbs, fainting fits, retching, and became "irritable, jumpy, and restless of nights." In June, 1914, he first attended the Western Ophthalmic Hospital under the care of Mr. E. Kenneth Campbell, and was there found to have choroido-retinitis. He was treated with iodides, but in spite of treatment vision gradually got more and more dim and his general condition became progressively worse. In January, 1915, he developed herpes zoster around the inner side of the right knee.

The patient is a small, well-developed child, aged 12, weighing 4 st. 12½ lb. He shows few stigmata of congenital syphilis. The head measures 19¾ in. in circumference, 14½ in. from nasion to inion, and the bimeatal circumference is 13½ in. The bridge of the nose is well developed and there are no scars around the angles of the mouth. The teeth are not characteristic; the arch of the palate is high and narrow. He is blind, and with his right eye cannot even recognise the difference between light and darkness; with his left eye

he is unable to count fingers. The optic disks on each side are in a condition of white atrophy. There is much excess of pigment around the margins of the left disk and evidence of old choroidal changes in both fundi. Smell and taste are unaffected, and hearing on both sides is good. He recognises the ticking of a watch at a distance of 12 in.



with either ear. The corneæ show no evidence of old interstitial keratitis. The pupils are unequal in size, the right being the larger; neither reacts either to the strongest light or on attempted convergence. There is no ocular paralysis, but the visual axes are rarely parallel. Ptosis and nystagmus are absent. The movements of the jaws, face, palate, larynx, and tongue are completely unaffected. The tongue can be protruded straight and held steadily. Gait is normal. Romberg's sign is not obtained. Co-ordination of the hands is little impaired, and

the alignment of the fingers is fair. There is no local muscular wasting and the tone of the muscles of the extremities is unaffected. He has complained in the past of shooting and aching pains in the body, neck and extremities, but in recent times these have not been so troublesome. To sensory testing no gross loss of sensibility to stimulation with the pricks of a pin; the light touches of cotton-wool, pressure, passive movement, the vibrations of a fork, heat, cold, localisation, shape, size, form, weight, and consistency, can all be demonstrated. Over certain areas marked in the diagram he says that all painful stimuli seem "sharper," "hurt more," and are "funny." These areas seem to correspond with definite root-areas. The over-reaction is most intense on the inner side of the knees, and is greater on the right leg than on the left. The knee-jerks cannot be obtained even on reinforcement, and the ankle-jerks are abolished. Both plantar reflexes give a flexor response. The abdominal reflexes on both sides are extremely brisk. The wrist- and elbow-jerks are normal, and a jaw-jerk is obtained. The action of the sphincters is controlled. On the inner side of the right knee, at the level of the insertion of the tendon of the adductor magnus, is a patch of herpetic vesicles (1 in. by  $1\frac{1}{2}$  in.), otherwise there are no vasomotor or trophic changes. He suffers from time to time from attacks of generalised headache, referred chiefly to the frontal region. The headache leads to a feeling of nausea, but rarely to actual vomiting. He has never suffered from fits or other forms of seizure. Speech is normal. Memory is fair and attention good. He sleeps well, but some weeks ago suffered from nightmares and bad dreams. Hallucinations and delusions are not present. There are no abnormal signs in the heart, vessels, lungs, abdomen, testes, or urine. The Wassermann reaction both in the serum and in the cerebrospinal fluid is positive, and the cells in the cerebrospinal fluid number 25 per cubic millimetre.

Until recently this case would undoubtedly have been diagnosed as one of juvenile tabes dorsalis and no antisyphilitic treatment administered, but the sensory changes are those characterising a meningitic affection of the nerve roots, and no evidence of any disturbance in the posterior columns is forthcoming. The appearance of a herpes zoster of the fourth lumbar area, whilst the patient has been under observation, confirms the diagnosis of the extra-medullary site of the principal lesions. Under treatment with intravenous injections of salvarsan or neo-salvarsan this patient should improve considerably. Another noteworthy feature in this patient is the distribution of the root lesions. In the nervous manifestations occurring after infection

with acquired syphilis, Head and one of us<sup>1</sup> have shown that the nerve roots most commonly affected are those cervical roots which are related to the tonsil and pharynx (cervical 2 and 3), those thoracic roots related to the aorta (thoracic 2 and 3), those thoracic roots related to the main mass of the abdominal viscera (thoracic, 9, 10, 11, and 12), and the lower lumbar and sacral roots. Here in a case of nervous disease consequent on congenital syphilis the same roots are affected. Such findings add weight to the hypothesis that the spirochæte travels up to the central nervous system by way of the lymphatics which accompany the nerves.

### Case of Pituitary Infantilism (Lorain Type) with Hydrocephalus and Optic Atrophy.

By WILFRED HARRIS, M.D.

J. W., AGED 21, height 3 ft. 8 in., weight 49 lb., is the second child of six, the others and the parents being normal. He is said to have had meningitis at the age of 2, and has been subject to occasional epileptic fits since. Said to have ceased growing when aged 6. Always strong, and a good walker, has walked 37 miles in one day. Sings in a fine treble voice, and dances and sings well as a music-hall artiste. Head measurement: Occipito-glabellar 21 in., and intrameatal 14 in. over vertex. Head distinctly hydrocephalic. Body and limbs well formed, but general appearance is that of a child aged 6. No development of hair except on scalp, and testes not fully descended. Skiagrams show unossified epiphyses, and a very large sella turcica. Five ounces of glucose produced nausea, but no glycosuria. Vision has been failing for nearly twelve months, and the left eye is blind save for perception of a strong light in the temporal field. Vision of right eye counts fingers only in upper nasal field. Fixation excentric. Right pupil reacts directly to light, and the left consensually only. The optic disks are both atrophic, with blurred edges. Lumbar puncture showed normal cerebrospinal fluid, removal of 25 c.c. improving the vision decidedly.

<sup>1</sup> Head and Fearnside, *Brain*, 1914, xxxvii, p. 137.

## DISCUSSION.

Dr. LEONARD GUTHRIE thought that the excessive size of the sella turcica, as revealed by the photographs, was in favour of the existence of a pituitary tumour, and he doubted whether such enlargement could be caused by downward pressure of a third ventricle distended by fluid. It was possible that the moderate amount of hydrocephalus present might be due to pressure on the third ventricle by a pituitary tumour. Infantilism might certainly be due to extreme hydrocephalus alone, and perhaps hypopituitarism, in such cases, was induced by pressure upon, and blockage of, the infundibulum. He had watched a case of hydrocephalus (due to cerebellar tumour) from the age of 5 until death at the age of 19. During all those years the patient had not grown an inch, and he remained, except for the huge size of the head, as infantile in appearance at 19 as he had been at 5. In Dr. Harris's case he believed the infantilism was caused by pituitary tumour, but the presence of hydrocephalus contra-indicated any attempt to remove the tumour.

Dr. F. PARKES WEBER said that apart from the symptoms due to mechanical disturbance in the neighbourhood of the sella turcica, the case shown by Dr. Harris fell amongst those which Mr. Hastings Gilford had grouped together under the heading "ateleiosis." He thought that, in spite of the little man's apparent quickness in answering, it would be interesting to have the intellectual development examined as carefully as possible by the Binet or similar tests. In two cases of ateleiosis (one of them was a man, aged 45) such an examination was kindly carried out for him by Dr. Reginald Langdon-Down<sup>1</sup> with very striking results.

Dr. E. G. FEARNSIDES said that although manifestations of some interference with the functions of the pituitary body were frequently seen in patients showing signs of increased intracranial pressure, and were especially common in young subjects with signs of chronic hydrocephalus, in his experience these usually took the form of the dystrophia adiposo-genitalis; in these cases the skiagram showed an extremely shallow, small pituitary fossa. In the two cases of the Lorain type of dyspituitarism which he had himself observed, unequivocal signs of tumour formation in the region of the optic nerves and and cerebral peduncles had been present, and in the X-ray of each the sella turcica was much distended, and its outlines distorted—findings similar to those observed in Dr. Harris's case. He believed that as a cause for the manifestations in Dr. Harris's case a super-imposed tumour would be found in the neighbourhood of the pituitary gland.

<sup>1</sup> F. P. Weber, "Two Cases of Ateleiosis," *Brit. Journ. Child. Dis.*, Lond., 1913, x, p. 346.



## Chronic Polyneuritis with Optic Neuritis.

By WILFRED HARRIS, M.D.

T. B., AGED 38, six years ago had a bad fall from a bicycle, causing concussion; unconscious twenty-four hours; since then he has never been well. Two years ago vision began to fail, and soon after feelings of cramp commenced in lower calves, and increasing tiredness and difficulty in walking. Occasional shooting pains in feet and toes, with numbness of toes and legs, and inner sides of hands and forearms. During the last nine months paroxysmal dead fingers and cyanosis of the extremities. Acquired syphilis twenty years ago. During the last eight months he has been under my observation, and has become steadily weaker, developing atrophy of the legs with foot-drop. All the deep reflexes, with the exception of the jaw-jerk, are absent. Plantars not obtained. Pupils normal. Ocular movements normal. Well-marked chronic double optic neuritis, with 2D. swelling. Vision,  $\frac{1}{8}$ . No central scotoma. Marked analgesia of the feet and legs, but no anæsthesia of the hands. When first seen in July last there was no wasting of the legs, though weakness and wasting of the legs, with marked foot-drop, developed during September and October. Wassermann's reaction positive in July, and 0.6 grm. of salvarsan was then given intravenously, followed by autoserum intrathecally. No improvement at any time. Cyanosis of the extremities has increased, and he has fainted several times recently, his general weakness having increased considerably. Lumbar puncture in November found the fluid normal, with negative Wassermann's reaction. No sphincter weakness at any time. The case thus appears to be one of polyneuritis, though the slow progress of the disease during two years, and the optic neuritis, are very unusual features. Questions for discussion are whether the disease is connected with his syphilitic history, or with the severe fall and concussion of six years ago.

**Two Cases of Nerve Injuries caused by Bullet Wounds.**

By C. M. HINDS HOWELL, M.D.

*Case I.*—E. O., aged 32, was shot near Ypres on November 24, 1914. Bullet entered beneath the middle part of left clavicle; exit wound just below spine of scapula at junction of middle with outer third. Immediate loss of power in arm, and loss of all cutaneous sensation in limb. At first severe pain felt along inner aspect of upper arm. Cutaneous sensation rapidly began to return, and is now normal. Motor power: About a month after injury voluntary power began to return in muscles supplied by ulnar nerve, and this has steadily improved. Within the last month some voluntary power has appeared in the extensors of fingers and wrist, and to a slighter degree in flexors of fingers supplied by median nerve. There is no return of power in any other muscles supplied by brachial plexus. The muscles of shoulder-girdle and upper arm are much wasted; those of the forearm do not show much wasting. There is complete R.D. in all muscles, with the exception of those supplied by the ulnar nerve, whilst there is partial R.D. (sluggish reaction to galvanism, feeble reaction to faradism) in the flexors of the fingers and wrist.

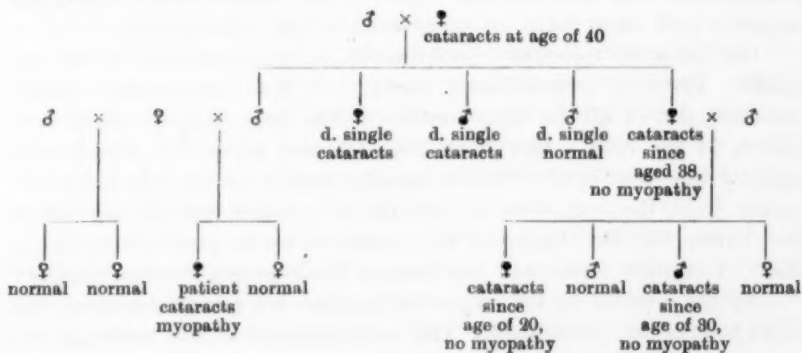
*Case II.*—A. C., aged 28. Received bullet wound through abdomen about November 12, 1914. The bullet entered just beneath the gall-bladder, and the wound of exit through the back is to the right of the third lumbar spinous process. There was immediate loss of power in the right leg, and loss of cutaneous sensation. There has been gradual recovery, and the present condition is as follows. Motor system: Left leg unaffected. Right leg shows wasting of thigh muscles, with weakness in flexing thigh and in extending knee and dorsal flexion of foot. There is much less weakness of plantar flexion and flexion of knee. Sensation (right side): Complete anæsthesia in area supplied by fifth lumbar root; partial anæsthesia in areas supplied by fourth lumbar and first sacral roots. Left leg normal. Knee-jerk and ankle-jerk absent in right, present in left. X-ray photograph shows a diagonal fracture of body of third lumbar vertebra.

# Case of Myopathy (? Myotonia Atrophica) with a Family History of Cataracts but no History of Familial Myopathy.

By E. G. FEARNSIDES, M.D.

M. N., SINGLE, at home; born 1871.

Family history: Her paternal grandfather and grandmother were cousins, and a great grandmother on the father's side were also cousins. Her paternal grandmother developed cataracts at the age of 40. Her father and mother were normal. A paternal uncle and a paternal aunt, both of whom died unmarried, developed cataracts before the age of 40. A paternal aunt and two of her children, one male and one female, all of whom I have seen, developed cataracts between the ages of 20 and 38, and show no myopathic wasting. The patient herself was one of two children, but by her mother there are two older half-sisters who are completely normal and her own sister is unaffected. As far as can be ascertained there is no family history of myopathy or neuromyopathy.



Personal history: Until the age of 31 her health was uniformly good and she was able to take part in outdoor games, dances, &c. In 1902, however, she developed bilateral cataracts and was operated upon by Mr. L. V. Cargill at the Royal Southwark Hospital; after the operation her sight returned with the use of high myopic glasses, and since that time has remained good. One day in 1903 or 1904, whilst at a dance, she noticed that her neck had become so weak that she could not bend

it forward. Since that time she has complained of gradually increasing weakness in the muscles at the back of the neck and progressive disability in supporting her head. At the present time this weakness is so great that she cannot lift her head from the pillow without the help of her hands; she complains that "her head flops about." In the spring of 1908 she first found difficulty in walking and more especially in getting upstairs. Early in 1914 this weakness had become so great that she was unable to get up from a chair. About the same time she began to complain of feelings of "general tiredness and exhaustion after the slightest exertion with difficulty in speaking for a long time, and at times also of considerable difficulty in swallowing." Nevertheless she stated that this weakness was not much greater at the end of the day than it was in the early morning after waking, and that the onset of the fatigue was not extremely rapid.

She was admitted to the Hospital for Epilepsy and Paralysis, Maida Vale, in December, 1914. At that time her weight was 7 st. 4 lb. She was generally wasted and her appearance was somewhat cachectic, but she was not anæmic. No physical signs of gross disease were discovered in the heart, lungs, vessels, or abdomen, and the urine contained neither albumin nor sugar. The Wassermann reaction was negative and there were no suggestions of venereal disease.

Her general muscular development is poor and her limbs are small. There is intense local wasting of the trapezii and sternomastoids and of all the deep muscles at the back of the neck on both halves of the body. Her head flops forward when she attempts to slightly flex her head. She is usually unable to lift her head forwards from the bed when it is lying on a pillow without the aid of her hands, but the degree of this weakness varies greatly from day to day. Voluntary rotation of her head on the neck is almost impossible.

All the muscles of the upper extremities are poorly developed, but their tone is not diminished. The small muscles of the hands are not more affected than the muscles of the forearms, and the extensor and flexor groups of muscles of the forearms are affected almost equally. The deltoids, biceps, and triceps are fairly developed and moderately powerful. The serratus magnus muscles on both sides are small and weak, but more definitely so on the right side, and both scapulæ are winged. The latissimus dorsi and the lower portions of the pectoralis major muscles on each side are wasted and defective in power. The supraspinati and infraspinati are relatively well developed. The levator

anguli scapulæ muscles are unaffected and act powerfully. The thoracic and lumbar portions of the erector spinæ are not grossly affected and there is neither lordosis nor scoliosis. The abdominal muscles are well developed and the diaphragm acts normally.

All the muscles of the lower extremities are small and ill developed. The left buttock is smaller than the right, but all the gluteal muscles are definitely atrophic and weak. The left great trochanter is extremely prominent. The left quadriceps extensor and more especially its vasti portions are small and were, in December, 1914, so feeble in power that the patient whilst lying in bed was unable to hold her knee fully extended. Under massage some power has now returned. The right thigh is less affected than the left, but the thigh muscles on this side proportionately to the rest of the muscles of the limb are wasted. The adductors of the left side are smaller and less powerful than those of the right. The anterior tibial muscles are all grossly affected, but all these muscles act under volition and there is no foot-drop. The left ankle can be dorsiflexed beyond a first angle. The small muscles of the feet are affected to a less degree than the other muscles of the lower extremities.

No fibrillary twitchings have ever been witnessed and myotonic symptoms have never been observed. There is no local hypertrophy or pseudo-hypertrophy of any muscle.

To galvanism and faradism all the muscles react slightly; the responses, however, in the atrophied muscles are small and difficult to obtain. Jolly's myasthenic reaction has never been observed. Myasthenic symptoms cannot be demonstrated in any muscles of the trunk or extremities. She states that the power in the muscles of her limbs is feeble and that she easily tires.

The nails on the hands and feet are normal and the hair-follicles on the extremities unaffected. The skin over the hands and feet tends to be blue and presents a sodden appearance. To sensory testing no gross interferences can be discovered. The light touches with cotton-wool, the pricks of a pin, the vibrations of a fork ( $C = 128$ ), sizes, shapes, forms, weights, &c., are all well recognised and named. On both sides the knee-jerks are doubtfully obtained, but no ankle-jerks and usually no plantar responses can be elicited. Wrist-jerks and elbow-jerks are just present. The abdominal reflexes are present. The jaw-jerk cannot be obtained. The ocular and pharyngeal reflexes are normal. The left knee-joint shows a condition of genu recurvatum. At times, in the past, she has complained of some difficulty in holding her water

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and motion; this, however, has never been very definite and whilst the patient has been under observation has not been present.

The pupils react normally to light and to accommodation. Both upper eyelids tend to droop, but ptosis is not definitely present. Ocular movements are well carried out. She has never suffered from diplopia or squint and nystagmus is absent. Cataracts have been removed from both eyes. The face is thin, angular and flat; its movements are of full range and symmetrical. She can blow out her cheeks. The masseter and temporal muscles are small, but contract powerfully. The tongue is well developed; it can be protruded straight and held steadily. The movements of the palate and larynx are normal. At times she has had some difficulty in swallowing and says that she easily tires with talking; since December, 1914, however, these symptoms have not been troublesome. No myasthenic weakness of the tongue can be demonstrated. The special senses are unaffected; vision with glasses for her myopia is fair. Taste, smell, and hearing are normal.

She is well informed, contented, attentive, and not emotional. Memory is good. Her voice is nasal in tone. She sleeps well and suffers neither from headache nor from attacks of vomiting. There is no evidence of disease in the thyroid, thymus, pituitary or adrenal glands.

This case raises four interesting problems: (1) The differential diagnosis between myopathy and myelopathy; (2) the question as to whether myotonia atrophica can be diagnosed in the absence of any myotonic symptoms; (3) the familial and hereditary relationships between myotonia atrophica and cataract; (4) the relation of myasthenia gravis to myotonia atrophica.

The distribution of the muscular wasting in this patient is myopathic in type. The muscles chiefly involved are the sternomastoids, trapezii, deep muscles of the neck, serratus magnus, latissimus dorsi, supraspinati, glutei, vasti, and anterior tibial muscles, and to a less extent the muscles of the forearms. The cheek muscles are certainly involved and I think that the facial muscles are also slightly affected. This distribution of atrophy is similar to that seen in cases of myotonia atrophica, except that the deep muscles of the neck are more atrophic than they have been in any case of myotonia atrophica of which I have seen any record.

Fibrillary twitchings, hypertrophy, and myotonic symptoms have never been observed. Can myotonia atrophica be diagnosed in the absence of myotonic symptoms? If this question can be answered in the affirmative I think that this patient is a case in point.



The patient when she first came under observation complained that the muscles associated with deglutition and articulation easily tired, but said that this rapid fatigue did not affect her neck or extremities. Was this weakness of the same nature as that which occurs in cases of myasthenia gravis?

As far as I have been able to ascertain, the frequent association of familial and hereditary cataracts with muscular wasting amongst the myopathies only occurs in myotonia atrophica. Greenfield [3] first recorded this association; in the family recorded by him seven cases of cataract and four of myopathy occurred in three generations. Hoffmann [5] in 1912 analysed the cases of myotonia atrophica recorded in the literature up to that date and found that in 10 per cent. (eight out of eighty) cases of myotonia atrophica this association had occurred. He noted that there were families in which some members showed cataract without myotonia atrophica, other members myotonia atrophica without cataract, and still others both myotonia atrophica and cataract. This association of myotonia atrophica and cataract has also been recorded by Ormond [7], Obendorf and Kennedy [6], Tetzner [8], Hirschfeld [4], myself [2], Bramwell and Addis [1], and seems to me to form additional ground for classifying this case amongst those of myotonia atrophica.

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**Case of Infantile Hemiplegia affecting the Left Half of the Body, with considerable Under-development of the Left Upper Extremity; Jacksonian Convulsions affecting the Paralysed Upper Extremity; Petit Mal.**

By E. G. FEARNSIDES, M.D.

C. M., BORN 1907. The patient was the fifth child of a family of seven children, four of whom survived. The father and mother were healthy. One child died from "measles and bronchitis" at the age of 16 months, a second of "appendix abscess" when aged 4 years, and a third of "meningitis" at the age of 20 months. At birth the patient was a small but apparently healthy child; as a baby he was constantly ailing. At the age of 6 months he was laid up for some weeks with "whooping-cough and bronchitis" and during this illness developed otorrhœa. He walked at the age of 13 months, talked at the usual time, and until the summer of 1910 seemed a perfectly normal child. Early in August, 1910, he had a "slight fit," which lasted a few minutes only and was not followed by any paralysis. On September 22, 1910, after a similar fit he vomited and lost consciousness, and for five days lay comatose. On September 28, when he recovered consciousness he was found to be hemiplegic and to have sustained a number of superficial burns, the largest on the left thigh, produced by the application of hot bottles to his limbs and abdomen. Between September 28 and October 10, 1910, when he first came under my observation, he was dazed and apathetic, asking for what he wanted and understanding more or less what was said to him. Although at this time he passed urine into the bed, yet he never passed a motion unwittingly. He coughed from time to time. On October 10, 1910, he was admitted to the London Hospital under the care of Dr. Percy Kidd and remained an in-patient until November 14, when he was discharged to a convalescent home.

On admission the temperature was not raised, the rate of the pulse was 96 beats per minute, and of respirations 24. The patient, who was pale and looked ill, lay in bed, somnolent and apathetic, but could be roused, and then was irritable and yawned frequently. From the right ear a copious discharge was seen to proceed through a large perforation in the drum, and it was observed that he preferred to lie with his head

on the right side and resented rotation of his neck, but there was no cephalic retraction. The right optic disk and fundus appeared normal; the inner margin of the left disk, however, was indistinct, but the vessels were unaffected. The left half of the face was paretic. The tongue came out straight on protrusion and the movements of the palate were unaffected. The left upper extremity was flaccid and could not be moved voluntarily. The left lower extremity was stiff, spastic, and extremely paretic. On the left half of the body the deep reflexes were increased, ankle clonus was obtained, and the left plantar response was extensor; on the right side the reflexes were normal. Abdominal reflexes were obtained on both sides and Kernig's sign was not present. On the external aspect of the left thigh were two recent burns ( $1\frac{1}{2}$  in. by 3 in. and  $1\frac{1}{2}$  in. by 2 in.), and smaller burns were seen on the inner aspects of the right thigh and right arm. He passed urine incontinently under him, but asked for the chamber. No abnormal signs were discovered in the heart, lungs, abdomen, and urine, and during the whole period of observation the temperature was never raised above  $99^{\circ}$  F. On October 11, 2 oz. of clear cerebrospinal fluid were obtained by lumbar puncture; this fluid was sterile and contained no excess of cells.

After admission he gradually improved, became less irritable, and soon began to take interest in his surroundings. The burns healed rapidly; the paresis of the leg soon cleared, and the signs of facial involvement disappeared before discharge. Gradually also a certain amount of power of movement returned in the left upper extremity. On November 14 he was discharged to a convalescent home; at this time he walked well and was able to use left upper extremity in feeding himself. Whilst still in the country, on December 5, 1910, he became drowsy, refused food, and developed copious otorrhœa on both sides; the temperature rose to about  $103^{\circ}$  F., and the glands behind both mastoid processes enlarged and became tender. He was readmitted to the London Hospital on December 17, 1910, and remained an in-patient until January 5, 1911. On discharge he showed a characteristic left-sided hemiplegia affecting chiefly the upper extremity. The left leg was slightly spastic, but the left upper extremity was in general hypotonic, although at times mobile spasms of the distal portion of the extremity were observed.

Since this time he has been constantly under observation. In September, 1911, he became subject to "fits." These attacks always have begun in the affected left arm and thence spread progressively to the forearm and hand; frequently the whole of the left half of the body

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is involved, and occasionally consciousness is lost in a generalised convulsion. The attacks occur at irregular intervals, and usually several occur together. On December 21, 1911, he was again admitted to the London Hospital. The attacks, which I witnessed at this time, were characteristically Jacksonian and affected the left shoulder, left arm, left forearm, left hand and left leg; consciousness was not lost. Despite treatment since this time the fits have continued. In December, 1911, the muscular development and the length of the bones of the left upper extremity were very similar to those which he now presents, and the left upper extremity was proportionately smaller than the other extremities; the head was asymmetrical, and distinct paresis of the left half of the face was present, but on protrusion the tongue came out straight. Ankle clonus and a Babinski extensor response were present on the left side. Since this time the left upper extremity has grown little, if at all, either in length or in diameter.

On January 29, 1915, he again came under observation, complaining of "bouts of fits." In each fit movements are seen to begin in the region of the left elbow and spread thence to the left shoulder and left hand, and also to affect the joints of the left lower extremity and the muscles of the left side of the face. Consciousness is rarely lost. After each fit voluntary power over the left half of the body is much diminished. In addition to these Jacksonian convulsions he also suffers from frequent momentary attacks of petit mal.

The patient is a small, undersized boy, aged  $7\frac{1}{2}$ , weighing 2 st. 13 lb. He is observant and fairly intelligent. The head is asymmetrical; its circumference is 19 in., the bimeatal diameter 13 in., and the distance from nasion to inion measures  $13\frac{1}{2}$  in. The left upper extremity in every proportion is much smaller than the right. The under-development is most noticeable in the region of the upper arm and shoulder. There is no shortening of the left lower extremity. The muscles of the left upper extremity are, in general, hypotonic, but occasional waxing and waning of muscular tone can be observed. The deep reflexes on the left half of the body are increased; the knee-jerk is exaggerated, ankle clonus can be elicited, the wrist- and elbow-jerks are brisk, and the left plantar response is extensor. Abdominal reflexes are present on both sides. No sensory interferences can be demonstrated. The left hand and wrist are always cold, blue and clammy, and the left foot and ankle tend to be cyanotic. The action of the sphincters is normal. The pupils react normally to light and accommodation. Ptosis, nystagmus, and diplopia are not present. The furrows on the

left face are less definite than on the right, but all voluntary and emotional movements are symmetrical. The movements of the palate, larynx, and tongue are unaffected. The Wassermann reaction in the serum is negative.

MEASUREMENTS.			
<i>Upper Extremity.</i> —			
Acromion—tip of middle finger ... ..	Left	Right	
Acromion—olecranon .. .. .	18 $\frac{7}{8}$ in. ...	20 in. ...	
Olecranon—styloid process of ulna ... ..	7 $\frac{3}{4}$ " ...	8 " ...	
Wrist—tip of middle finger ... ..	6 " ...	6 $\frac{1}{4}$ " ...	
Wrist—tip of middle finger ... ..	5 $\frac{1}{4}$ " ...	5 $\frac{1}{4}$ " ...	
<i>Arm.</i> —			
Circumference at olecranon ... ..	5 $\frac{1}{4}$ " ...	5 $\frac{1}{4}$ " ...	
Circumference 2 in. above olecranon ... ..	5 $\frac{1}{4}$ " ...	6 $\frac{1}{4}$ " ...	
Circumference 4 in. above olecranon (at rest) ... ..	5 $\frac{1}{4}$ " ...	6 $\frac{1}{4}$ " ...	
Circumference 4 in. above olecranon (in flexion) ... ..	5 $\frac{1}{4}$ " ...	6 $\frac{1}{4}$ " ...	
Circumference round axilla ... ..	10 " ...	10 $\frac{1}{2}$ " ...	
<i>Forearm.</i> —			
Greatest circumference of forearm ... ..	5 $\frac{1}{4}$ " ...	6 $\frac{1}{4}$ " ...	
Circumference 2 in. below condyle ... ..	5 $\frac{1}{4}$ " ...	6 " ...	
Circumference 4 in. below condyle ... ..	4 $\frac{1}{4}$ " ...	4 $\frac{1}{4}$ " ...	
Greatest circumference of wrist ... ..	4 $\frac{1}{4}$ " ...	4 $\frac{1}{4}$ " ...	
Glove-circumference of hand ... ..	5 $\frac{1}{4}$ " ...	5 $\frac{1}{4}$ " ...	
<i>Chest.</i> —			
Circumference of chest at level of nipple ... ..	11 $\frac{1}{2}$ " ...	12 " ...	
<i>Lower Extremity.</i> —			
Anterior superior iliac spine—internal malleolus ... ..	20 $\frac{3}{8}$ " ...	20 $\frac{3}{8}$ " ...	
<i>Thigh.</i> —			
Circumference just above patella ... ..	8 $\frac{1}{4}$ " ...	8 $\frac{1}{4}$ " ...	
Circumference 2 in. above patella ... ..	9 $\frac{1}{4}$ " ...	9 $\frac{1}{4}$ " ...	
Circumference 4 in. above patella (scar) ... ..	10 $\frac{1}{4}$ " ...	11 " ...	
Circumference 6 in. above patella (scar) ... ..	11 $\frac{1}{8}$ " ...	11 $\frac{1}{8}$ " ...	
<i>Leg.</i> —			
Circumference 2 in. below patella ... ..	7 $\frac{1}{4}$ " ...	7 $\frac{5}{8}$ " ...	
Circumference 4 in. below patella ... ..	7 $\frac{1}{4}$ " ...	7 $\frac{5}{8}$ " ...	
Circumference 6 in. below patella ... ..	5 $\frac{7}{8}$ " ...	6 " ...	

### Removal of Spinal Cord Tumour.

By JAMES TAYLOR, M.D., and DONALD ARMOUR, F.R.C.S.

T. C., AGED 48, complains of loss of feeling in fingers for two years; weakness in arms, numbness in feet, and weakness in legs for last six months. On admission: Weakness in both arms, right and left; muscles flabby, not wasted; anæsthesia below level of C<sub>4</sub>, more marked left side. Weakness and some unsteadiness of legs. Knee-jerks + ankle clonus, right > left. Plantar extensor right, indefinite left. At the operation a small tumour was removed at the level of the third cervical segment, and the patient has made an uninterrupted recovery.

**Case of (?) Syringomyelia ; (?) Hypertrophic Cervical  
Pachymeningitis.**

By A. FEILING, M.B.

E. B., AGED 61, Jew, has suffered for the last three years from a progressive difficulty in walking. Occasional aching pains in arms and hands and across nape of the neck. No pains in the legs.

Past history: Syphilis in 1880. In 1884 gonococcal rheumatism, followed shortly after by paralysis of the left third nerve. In 1887 left hemiplegia of sudden onset, with subsequent good recovery. 1911: Injury to right middle finger, which was burnt by fomentations and was observed to be practically painless.

Family history: One child alive and well. Wife had two miscarriages.

Present condition: Slight ptosis of left eye. Pupils unequal; left > right. Left pupil dilated, irregular in shape; does not react to light; reacts feebly to accommodation. Right pupil normal in shape and size; reacts sluggishly to light. Fundi natural. Ocular movements unrestricted in all directions. Arms: Wasting of both forearms, specially of extensors of wrist; slight wasting of small hand muscles, specially on right side. Fibrillary twitchings have been seen. Contracture of fingers of right hand, with production of a modified "main en griffe." The fingers of the right hand are swollen, with enlargement of the joints; they are cold. Tendon-jerks not obtained in the arms. Legs: A condition of spastic paraplegia is present. No muscular atrophy. Both knee-jerks and both ankle-jerks are much exaggerated. Double extensor plantar response. Gait is typically spastic. Spine: Slight scoliosis in upper dorsal region. There is some rigidity of both cervical and dorsal regions of the spinal column. X-ray examination shows formation of new bone in connexion with the cervical vertebræ, leading to obliteration of the lateral joints. Sensation: Over the trunk and arms there is an extensive anæsthesia to sensations of pin-prick and heat and cold; this extends on the right side from about C<sub>4</sub> to D<sub>12</sub>, and on the left side from C<sub>3</sub> to L<sub>1</sub>. Sensibility to a light touch is well preserved everywhere. Over the anæsthetic area a pin-prick is practically never appreciated, while heat and cold are much confused. Wassermann's test is negative in the blood and in the cerebrospinal fluid. No increase of cells in the cerebrospinal fluid.



? Case of Amyotonia Congenita. ? Atonic Form of Cerebral  
Diplegia.

By E. G. FEARNSIDES, M.D.

(For Dr. F. J. SMITH.)

H. B., BORN April 7, 1910. Family history: The patient's father, born in 1881, is the third child of a family of three children, aged respectively 38, 35, and 33. The patient's mother is the eldest of four children, aged 33, 29, 27, and 23. As far as can be ascertained there is no family history of nervous or muscular disease. The parents married in 1900, and since marriage have enjoyed good health. Of this marriage the first child was a male, who suffered after birth from "convulsions" and died at the age of 4 months; the second, a girl now aged 12½, who is normal; the third, a normal boy, aged 8; and the fourth, the patient, aged 3½. Whilst carrying the patient the mother's health was good.

The child was born at term, and at birth weighed 7 lb. 8 oz. At the age of 3 weeks he was found to have a right inguinal hernia; he was taken to Shadwell Hospital, circumcised, and given a truss. For the first five months of life he was fed by the breast only; later he was fed on milk and barley water and then on milk and Allenbury No. 1 Food. When aged 6 weeks he was noticed to be "soft"; he was taken to doctors, who treated him for "wasting" and ordered dietetic treatment, with extra fat, oil and malt, and virol, and cold sponging. Despite treatment, however, he gained weight slowly. In June, 1912, he began to suffer from a nasal discharge; this continued off and on until November, and in September, 1912, was complicated by the appearance of otorrhœa. In October, 1912, he was treated at the Aural Department of the London Hospital for "rhinorrhœa and otorrhœa"; under treatment these discharges ceased. In November 1912, a radical cure for right inguinal hernia was performed by Mr. Lett; the wound healed by first intention. He was able to say "mam" and "dad" at the age of 8 months, cut his teeth at the age of 13 months, but did not walk till he was aged 2.

He first came under my observation in December, 1912. At that time he seemed to be a characteristic example of the disease amyotonia

congenita. He could not talk. He dribbled continuously. He could not sit up. His habits were dirty, but yet he could make his requirements known and was intelligent. He made attempts to feed himself. He was a small, thin, pale, limp child. His hair was long and lax. The ears, palate and face were well developed. The head was large and the



FIG. 1.

forehead high. The fontanelle was almost closed. The teeth were normal. No abnormal signs were discovered in the heart, lungs, abdomen, or urine. The special senses and optic disks were normal and the cranial nerves unaffected. The muscles of the face and those moving the jaw were feeble in power. The face was flat and expressionless. The musculature throughout the body and limbs was small and



FIG. 2.



FIG. 3.

Figs. 1, 2 and 3 are photographs of the patient taken on December 27, 1912, to illustrate the severe grade of amyotonia of the upper and lower extremities and of the trunk which was present at this time.

absolutely atonic. The ligaments were relaxed and the limbs could be placed into all sorts of fantastic positions without causing any inconvenience. The movements of the spine were extremely free. The usual muscular pads under the great toes were absent. On palpation it was impossible to distinguish the limits between subcutaneous tissue and muscles. The muscular regions had a peculiar soft, velvety feel. A limb held by its proximal end could be shaken like a flail. Contractures were not present and there was no deformity of the body or limbs. All voluntary movements could be performed quickly and with normal range. The bones appeared to be unaffected. No sensory changes could be demonstrated. To electrical stimulation no changes were present. No deep reflexes could be obtained. The plantar responses were difficult to elicit; usually on stimulation of the sole a gross voluntary movement occurred. The photographs taken at this time well illustrate the amyotonic condition.

On January 7, 1913, the patient caught measles and was discharged. He was next seen at the London Hospital in August, 1914. At that time he complained of pain in the abdomen. The legs were much less hypotonic than formerly and knee-jerks could be elicited. In September, 1914, he was put into a double Thomas's splint, which he wore continuously until admission. On February 12, 1915, he was admitted to the London Hospital under the care of Dr. F. J. Smith, suffering from constipation and a distended abdomen; under the administration of enemata the dilatation entirely disappeared.

The patient is a bright, happy, contented child. He weighs 1 st. 13½ lb. The head measures 20½ in. in circumference, 13½ in. from nasion to inion, and 13½ in. from external auditory meatus to external auditory meatus. He is clean in his habits, but cannot feed himself. He knows the value of money and plays with toys. He no longer dribbles, but is babyish in his habits. Mentally he is certainly backward. Speech has a curious hesitating and nasal character and he uses few words to express his wants, but attempts to articulate many more. He never complains. The special senses and optic disks are unaffected. The pupils react normally and movements of the eyes, jaws, face, palate, larynx, and tongue can be carried out voluntarily through a normal range and with fair power. The face is flat and shows little expression. The hands and feet are proportionately long and narrow. The muscles of the upper extremities and trunk are intensely hypotonic. The wrists can be hyper-extended and hyper-flexed to such an extent that the hands can be brought into contact with the forearms. He can

sit up, but when sitting cannot hold his back straight. He makes feeble attempts at walking, crossing the knees, and extending the ankles. The muscles of the feet are hypotonic, those of the calves, thighs and to a less extent of the buttocks hypertonic. There is some contracture of the adductor muscles, and abduction of the thighs cannot be passively brought about through a normal range. The knees and hips can be fully flexed by the exertion of continued pressure, and the ankles can be dorsiflexed beyond the average limits. When the child is held by the axillæ the kyphosis of the spine is corrected, the



FIG. 4.

To illustrate the development of rigidity of the muscles of the lower extremities when the child is suspended by the axillæ. (Taken February 27, 1915.)

legs are extended at the knees and flexed at the hips (fig. 4). If one tries then to bend the legs they are found to be rigid. When lying in bed or sitting up he can move his arms and legs freely, but all his movements show gross inco-ordination, and in every movement of his extremities head, neck, trunk, and all four extremities partake. Dysenergy occurs in every voluntary effort. The child can be "folded" up on itself. All his ligaments are relaxed. There is no muscular wasting. No fibrillary twitchings have ever been observed. The

muscles of the extremities all respond normally on electrical stimulation. The relaxation of muscles after contraction takes place normally. The knee-jerks are extremely brisk and ankle-jerks can be readily obtained. Plantar responses are indefinite in type, but a true extensor response has never been observed. Abdominal reflexes are present. The wrist- and elbow-jerks cannot be elicited. The sphincters are controlled. The Wassermann reaction is negative. No abnormal signs in the organs are present.

Dr. F. E. BATTEN thought that the case shown was not one of amyotonia congenita, but belonged to the group described by Foerster under the title "Atonic Form of Cerebral Diplegia." The electrical reactions of the muscles were of considerable value in the differential diagnosis.



## Neurological Section.

March 25, 1915.

Dr. H. G. TURNEY, President of the Section, in the Chair.

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### The Psychology of Traumatic Amblyopia following Explosion of Shells.

By J. HERBERT PARSONS, D.Sc., F.R.C.S.

OPHTHALMOLOGISTS have become familiar recently with cases of amaurosis and amblyopia resulting from the shock of the explosion of shells at the Front. In many cases direct injury of such a nature as to cause definite organic lesion in the eye or visual paths can be eliminated. The earlier symptoms, which I have not personally observed, have been described and investigated by Dr. C. S. Myers, F.R.S.<sup>1</sup> The history of a typical case is briefly as follows: A man after more or less prolonged fatigue, induced by marching and exposure in the trenches, is incapacitated by the explosion of a shell in his immediate vicinity. He may be merely knocked down, or thrown into the air and more or less seriously injured or wounded by concussion, shrapnel bullets, or shell splinters. Consciousness is lost for a variable time, but often not so far as to prevent automatic movements, so that the man may walk in a dazed condition to a dressing station. The mental equilibrium at this stage is much disturbed, and all memory of this phase is usually lost. The most striking feature of the case is that the man is instantaneously struck blind. The blindness may be associated with deafness, loss of smell and loss of taste, but all these are less frequent than the blindness. On examination it is found that there is intense blepharospasm and lachrymation. The lids are opened with great difficulty and examination of the eyes is almost impossible. I am not aware of any record of the condition of the pupils at this stage. In the course of a week or two the blepharospasm diminishes and it

<sup>1</sup> *Lancet*, February 13, 1915, p. 316.

becomes possible to examine the fundi. Of course, there may be local injury to the eye, but in uncomplicated cases the eyes are found to be normal. The pupils react to light, though in some cases the reactions are sluggish, and sometimes one pupil differs from the other, being larger or more sluggish in its reactions. The fundi appear to be absolutely normal. By this time probably some restoration of sight has occurred. Light is perceived and large objects may be distinguished. As improvement occurs the patient manages to grope about, usually with his hands outstretched before him, but it is noteworthy that he does not usually stumble up against objects in his path. As soon as it is possible to take the fields of vision it is found that they are markedly contracted, and that indeed to a degree which seems scarcely consistent with the avoidance of obstacles in walking.

The recovery of vision is slow, but eventually it seems always to be complete. In the later stages I have had cases in which the right eye is more affected and recovers more slowly than the left. It may recover to the extent of having only a central scotoma, though this may reduce the visual acuity to  $\frac{6}{60}$  or less. By perseverance and encouragement the patient may be induced to read a few lines of the types, and I have had cases where the manipulation of weak plus and minus lenses has led to the full  $\frac{6}{6}$  being read.

Now there are several suspicious symptoms in many such cases. The eye to recover last is often the shooting eye. Some patients show an obvious disinclination to return to duty. Some candidly admit to being in a "blue funk." In all there has been a complete mental upset, sometimes accompanied by hysterical symptoms—outbursts of weeping, &c.—in the early stages. These features render it only too easy to jump to the conclusion that there is often a large element of shamming in the case. It is because there is very grave danger of cruel injustice being done to men who have "faced the music" and come battered out of the ordeal that I wish to attempt an explanation of the underlying psychology.

In the first place it is necessary to segregate these cases from allied conditions due to organic lesions or to malingering. It is not always easy to eliminate organic lesions of the type which cause so-called retrobulbar neuritis. It is still less easy to eliminate malingering, but as this depends upon a knowledge of the psychology of the individual it forms a prime object of the following discussion.

Since there is no demonstrable organic lesion these cases may be regarded as examples of injuries or wounds of consciousness. This does not imply that there is no neural lesion to account for the psychological

disorder, but merely that it has hitherto escaped observation. Without entering into a disputed question, which is largely metaphysical, we will adopt the view of parallelism between physiological neural processes and psychological events or changes in consciousness.

As regards cases of the type to which the group under consideration belongs, it may, I think, be admitted that the disorder of the conscious processes varies with the nature and severity of the injury, and with the organisation of the individual's character. Of these, the latter is by far the more complex, and in order to make my meaning clear it will be necessary, as briefly as possible, to sketch the evolution of character. In doing so I shall be guided chiefly by the deductions of such writers as C. Lloyd Morgan, J. Mark Baldwin, and William MacDougall, whose extraordinarily suggestive work does not seem hitherto to have been sufficiently brought to bear upon pathological problems.

Mental evolution may be divided into three stages, which may be called the sentient, the conscious, and the ideational. The sentient stage is exemplified in those organisms which show simple reflex response to stimulation. In the lowest stage of all, such as the amoeba, the three parts of the reflex arc—the afferent, central, and efferent—are not anatomically differentiated. Organic evolution is accompanied by anatomical complexity and correlation of reflex arcs. The conscious stage is exemplified by those animals, such as birds and lower mammals, in which complex and compound reflexes have become organised into instincts: mere sentience—as we may call it, for we can have no knowledge of what this lowest grade of consciousness really is—gives place to consciousness which is limited to the perceptual plane. The mind of such an animal is conscious only of the percepts derived from concrete objects. It reacts to these primarily in an instinctive manner in accordance with inherited instincts, the motor responses varying according to the species. In addition, however, it has acquired the ability to modify these motor responses in the light of experience. In other words, it is capable of controlling and modifying its instinctive reactions by intelligence. In the highest stage, which is reached so far as we know only by man, consciousness is raised to the conceptual plane. The animal has acquired the ability to think in terms of abstract ideas and to form rational judgments.

Animal life possesses one all-pervading feature, the capacity for, and manifestation of, movement, and from one end to the other of the scale the movements are teleological or purposive. It is for the metaphysicians to explain—if they can—why a merely sentient organism

manifests purposive movements when it is inconceivable that it can in any sense have knowledge of the end which will be ultimately attained. Indeed, it would be a bold assumption that such is really the case, if it were not unexceptionably proved that at a higher level many lower animals perform the most complicated instinctive actions for an end—often the preservation of the species—which it is quite impossible that they can foresee. Movement entails wear and tear of protoplasm, no matter how lowly it be, so that the fundamental teleological factor is the search for food, and biological necessity demands the preservation of the species. Hence the behaviour of the lowest organisms is directed to two ends, nutrition and reproduction.

The simple reflex is a purposive response to stimulation. The stimulus sets up an afferent impulse which acts upon a central mechanism. The motor response is determined in the centre by the nature of the afferent impulse, and in its simplest form is a positive or negative taxis.

The simple instinct, compounded of complex reflexes, shows a similar tripartite nature—afferent, central, and efferent. The afferent impulses so modify the central mechanism as to give rise to an affective state in consciousness. This state is an emotion. It in turn gives rise to a definite and specific conation or striving to a particular end. The conation manifests itself in motor activities all designed to attain that end. In so far as the end is attained, the emotion is satisfied, and a pleasurable feeling is experienced; in so far as the end is thwarted, displeasure is experienced, and this usually reinforces the conation until eventually the end is attained.

MacDougall enumerates the following primary instincts and emotions of man: the instinct of flight and the emotion of fear, the instinct of repulsion and the emotion of disgust, the instinct of curiosity and the emotion of wonder, the instinct of pugnacity and the emotion of anger, the instinct of self-abasement (or subjection) and of self-assertion (or self-display), and the emotions of subjection and elation (or negative and positive self-feeling), the parental instinct and the tender emotion, the instinct of reproduction; the gregarious instinct, the instinct of acquisition, and the instinct of construction. To these are added certain innate tendencies—sympathy, suggestion, imitation, and so on.

In addition to the afferent impulses received from external stimuli, others are received from internal organs. The sum total of the normal impulses determines the obscure background of consciousness (cœnæsthesia), on which the general tone of mental life depends. The

*disposition* of an individual depends upon the sum of all the innate instincts with their specific conative impulses. The *temperament* depends upon the influences exerted on the nervous system, and through it on the mental process by the functioning of the bodily organs, and on the general functional peculiarities of the nervous tissues.

In lower animals the emotions are probably generally experienced in unmixed forms. In man they tend to become combined in organised systems, each centred in some object. These organised systems are the sentiments (A. F. Shand) of which love, hate and respect are the types. Admiration, awe, gratitude, scorn, contempt, envy, are complex emotions which do not necessarily imply the existence of sentiments. Reproach, jealousy, resentment, revenge, shame, remorse, sorrow, pity imply the existence of sentiments directed towards some object.

"It is only through the systematic organization of the emotional dispositions in sentiments that the volitional control of the immediate promptings of the emotions is rendered possible. Again, our judgments of value and of merit are rooted in our sentiments; and our moral principles have the same source, for they are formed by our judgments of moral value" (MacDougall).

Further, moral conduct is essentially social conduct. Psychology has been revolutionised in recent years by the writings of William James, G. F. Stout, and others, who have thrown into relief the previously well-nigh disregarded fact that the development of the individual mind cannot be explained by isolating it and examining its workings by introspection alone. Each mind is endowed with innate properties; these show inherited variations which cause one mind to differ from another. But, in addition to this, each mind is subject to acquired modifications due to its environment, and the most important element in its environment is the group of other minds with which it is brought in contact. Advance in moral conduct and the development of *character* are brought about by the growth of self-consciousness and of the self-regarding sentiment. The idea of self and the self-regarding sentiment are essentially social products, so that the complex conception of self ultimately attained is always of self in relation to others. MacDougall distinguishes four successive stages in the development of conduct: (1) The instinctive stage, modified only by the experience of pain and pleasure; (2) the stage of control by rewards and punishments; (3) the stage of control by anticipation of social praise and blame; and (4) the stage of regulation according to an ideal of conduct.

Such, in the sketchiest outline, is the mental evolution which culminates in the individual character. The analogies which have been arduously elicited from comparative psychology are very illuminating, but they must not be pressed too far. It is true that in physical development the individual rapidly recapitulates the chief stages of the history of the development of the species; but this is true only in a broad sense, and can only be proved of any detail by direct observation. Similarly in the mental evolution of the child, so ably studied by Preyer, J. M. Baldwin, and many others, an instinctive phase resembling that of lower animals, an animistic stage resembling that of primitive races, and so on, may be dimly indicated; but it is doubtful if a baby ever exhibits a complete yet unadulterated instinctive response.

Underlying the psychological development outlined above there is a physical neural development, in which the tremendous stride which the human species has taken beyond the anthropoid ape is most obviously shown in the enormous development of the pallium. The development of the cerebral cortex, however, has not taken place without the most extensive rearrangement of lower structures. Cerebral control does not mean simply control of unaltered units. It means also modifications in the units themselves—modifications in reflex and instinctive responses both in kind and degree.

To sum up this long, but necessary preamble, in the cases under consideration we are dealing with individuals of various moral and psychological character, disposition, and temperament. Their temperaments are determined chiefly by the condition of their visceral organs and circulation. Their dispositions are determined by the sum total of the conative impulses of certain primitive instincts, which vary within relatively narrow limits in their innate characteristics and relative strengths, and are subject to acquired modifications in accordance with the environment of the individual. Their characters are determined by their temperaments and modified innate dispositions, of which the latter are subject to a volitional control which varies according to their social environment and educative experience.

In the evolution from stage to stage through the phases reflex, instinctive and ideational, the earlier stage is not lost but is made to subserve the new conditions. Thus in the most highly developed species, man, all persist. The earliest or reflex stage persists in the lowest anatomical and physiological level. It can hardly be doubted that the highest is a function of the most recently and highly differentiated part of the cerebral cortex. Whilst, however, we may say that



the reflex mechanism is specially associated with the lower—segmental—region of the central nervous system, stretching from the mid-brain to the end of the spinal cord, owing to the elaborate rearrangement of structure and function which has occurred, it is at present impossible to localise with any degree of precision the neural bases of the higher instinctive and ideational processes. Their complexity is largely, though by no means wholly, a matter of correlation and association; and the anatomical basis of an isolated physiological function is to be sought rather in a unified system of widely spread neuronic paths—afferent, associational, and efferent—than in any so-called “centre.”

It is further to be noted that the subservience of the more primitive phases of evolution is associated with what may be described as subservience in consciousness. Afferent sensational impulses, modified by afferent visceral impulses and by other more subtle impulses due to previous experience, lose to a large extent their specific characters and become merged in a complex cognitive impulse. Even from this the mind springs forward, as it were, to the emotional state which is thus aroused, and becomes concentrated on the efferent conation. Consciousness is focussed on the appointed end; all else is relegated to a sub-conscious background.

The effects of an intense emotional shock on this highly complex system may, *a priori*, be expected to be manifold and complex. Let us consider the effects of a blinding flash of light. In the first place, it will produce certain definite reflex results, sudden closure of the eyes, retraction of the head, perhaps recoil of the whole body, and so on. Actual damage may be done to the delicate retinal structures, resulting in temporary or permanent defect of vision. But apart from these effects the strong light stimulus will have other far-reaching results. Sudden and unexpected visual sensations play an important part in the sensational complex which give rise to the emotion of fear. They are less potent as a rule in this respect than auditory stimuli. Nevertheless, they arouse an emotional state which varies from mere surprise to actual fear. Doubtless, the natural instinct of flight is suppressed in the adult by the intervention of the self-regarding sentiment, and manifests itself only in a sudden start. If the blinding flash is accompanied by a loud noise the emotion of fear is still more powerfully aroused; if also accompanied by an offensive smell the emotion of disgust is aroused and gives rise to repulsion.

The response of an individual to such a shock depends, therefore, essentially upon the degree of development of his self-regarding

sentiment. As we have seen, this depends upon his disposition—i.e., the sum of all his innate instincts, his temperament, and the modifications and control which these have acquired as the result of his environment and experience. We cannot, however, isolate the sensational complex which causes the shock from the concurrent circumstances. The response will vary also according to these conditions—e.g., according to whether the individual is alone or one of a crowd, and so on.

In the case of a soldier under shell fire the conditions are unique. The man is usually bodily fatigued, whereby his control is impaired. He has "the fear of death before his eyes," and is in a state of acute excitement, whereby his normal judgment is impaired. These conditions conspire to give his innate instincts ungoverned play. On the other hand, positive self-feeling, aided by suggestion and imitation, and the sentiments of patriotism, the honour of the regiment, his own honour, and so on, enforce his volitional control. At last, however, the shock comes which strikes him unconscious. It is not to be supposed that he is thereby anaesthetised to these emotional storms. It is rather to be conjectured that he is rendered "subconscious," and hence the more a victim of his lower instincts. This view is supported by the emotional behaviour of the men in the early stages, and by the fact that many of their actions can be revived by hypnosis.

The "unconsciousness" in these cases is to be explained physiologically by an abrogation of the functions of the highest level cortical cells. Recovery shows that the cells are not irretrievably damaged, and it is most likely that the block occurs on the afferent paths at the synapses of these cortical cells. Consciousness returns, but there is blindness. So far as objective evidence goes the lower visual paths are intact and function normally. The optic nerves carry their impulses, at any rate as far as the pupil reactions are concerned. The condition resembles uræmic amaurosis. I have seen it also in children after post-basic meningitis. The block is somewhere above the so-called primary optic centres—external geniculate bodies, optic thalami and superior colliculi. It, too, is probably the synapses of the cortical cells; in this case the synapses of the fibres of the optic radiations. Sometimes such a block occurs physiologically, and it is probably to be explained in the same manner. Everyone knows what may happen when reading an uninteresting book whilst the attention is diverted by some other train of thought. A paragraph is read and one suddenly becomes conscious of the fact that nothing has been conveyed to the mind; yet on reading it again one may recall certain sentences as undoubtedly having

been read, though they failed to reach the fully conscious mind. Perhaps the suppression of the image of a squinting eye is to be explained in the same manner.

It is definitely stated by Dr. Myers that smell is partially lost in spite of the fact that there is no unpleasant odour noticeable when a shell explodes. This is probably to be explained by suggestion.

I do not, however, think that it is necessary for the explanation of loss of vision and hearing that the visual and auditory paths respectively should have been definitely stimulated. These paths—situated in such intimate relation with the higher levels—play such a prepotent part in cerebral processes—equilibration, spatial percepts, and so on—that at any rate a partial visual block might be expected at times to persist beyond the recovery of consciousness. The duration of such persistence, however, is likely to be much greater if the primary shock has a powerful visual element, whether it be a blinding light or an awe-inspiring spectacle.

Though in the cases under special consideration there can be little doubt that the early loss of vision has a definite neural basis, it must, I think, be conceded that in the later stages the neural basis is of that undefined nature which we associate with so-called "functional" conditions. In other words it is neurotic; but it is not "shamming," difficult though it be to draw the line between them. I have had one case in which the vision of the left eye improved to  $\frac{6}{60}$ , while that of the right improved to  $\frac{6}{36}$ . By manipulating various glasses I succeeded in making the patient read  $\frac{6}{6}$  with + 0.5D. sph. and - 0.5D. sph. before the right eye, and + 6D. sph. before the left. He had the chance of taking a commission and was eager to do so. I feel convinced in my own mind from his character and demeanour that he was quite honest.

It has already been mentioned that in the earliest stage of recovered consciousness volitional control is almost, or quite, abrogated. The man is merely an emotional animal, or rather worse, for he is deprived of that intelligent control which plays such an important part in animal life. His behaviour is hysterical, but it is a passive hysteria, unlike the commoner active hysteria in which the partially emancipated emotions are often guided by some preponderant ideational impulse. There can be little doubt that in this stage the most potent of the primeval instincts—fear—holds almost undisputed sway, irrespective of the normal character of the individual, for the loss of volitional control implies the loss of the co-ordination of all those complex factors which make up the character of the man. As recovery progresses the outward manifestations of fear are more and more masked or suppressed, for the

self-regarding sentiment gradually again becomes restored. Its restoration, however, will be in accordance with the innate dispositions of the individual. If he is naturally mean-spirited it is unlikely that his self-regarding sentiment has developed beyond the stage of merely masking an ever-present pusillanimity; his motive power is limited to a sense of shame. If he is naturally of a fine character his fears will be suppressed with ever-increasing vigour as he becomes more and more conscious of the ideals of conduct which have shaped his character. In this stage of struggling to regain control the patient is at a disadvantage, and the acute observer will have the best opportunities for studying his springs of conduct. There are rare characters in which the emotion of physical fear appears to be non-existent, but in the vast majority of cases it is present, and however cleverly it is masked, or however nobly it is suppressed, it has to be reckoned with. If merely masked, it will prove a very powerful incentive to the avoidance of renewed exposure to danger, and a temporary disability may give place to deliberate fraud. If suppressed, it may yet require all the help which can be derived from the highest sentiments, reinforced by suggestion and by the active sympathy of discreet friends and advisers. These may all fail, but if so it is a case for pity and encouragement rather than contempt and obloquy.

It appears to me that these are the principles which should guide the medical adviser in his investigation and treatment of the case. We are accustomed to take the past histories and present conditions of our cases. In these "wounds of consciousness" the past history involves a difficult investigation of the innate dispositions and propensities of the individual, the environment to which he has been subjected in his home life, his school life, and his further career, and last, but not least, in the special cases under consideration, the motives which led him to join the Colours. For every man who enlists is not necessarily a ready-made hero. Many have enlisted merely because they are ashamed of not following the example of their friends. All honour to them, but they are not equipped with the sterling qualities of the man who is impelled by a noble ideal. The latter may recover completely from the shock, reinforced indeed by the sense of a moral victory won. The former may remain partial wrecks, too fearful of a renewal of their terrifying experience to be of any use in the fighting line. By injudicious forcing they may be wrecked entirely. On the other hand, by carefully studying their habits and tastes, they may be switched off into other paths which will lead to the restoration of self-esteem and make them again useful members of society.

The investigation of the present condition is simply psycho-analysis in the true sense of that much abused term. Amongst the many instincts and sentiments which have been enumerated and which will require to be studied and weighed, the sexual instinct will hold its proper, and no more than its proper relationship. It cannot be ignored, for it is at the foundation of the parental instinct, the tender emotion, and the sentiment of love. As such it is potent for good or evil, and it is the physician's part to utilise it for good as far as may be, and above all not to frustrate that end by his own indiscreet probings.

As Dr. Myers has shown, hypnosis may be valuable in reconstructing the history. I am doubtful as to its use as a method of treatment, but others are better qualified to judge on that point. As regards therapeutic measures, it should be remembered that fright causes great exhaustion of the suprarenal glands.

I have restricted my remarks to a special type of so-called traumatic neurosis, but it is obvious that the principles which have been discussed are capable of wide-reaching application.

#### DISCUSSION.

Mr. J. HERBERT FISHER had recently seen the case of a man who had some two or three weeks earlier been rendered unconscious by the detonation of a high-explosive shell, and who on recovering consciousness found the sight of the right eye quite dark. He was removed to a Base hospital, and it was not until some days had elapsed that he began to recognise some signs of returning sight in the eye complained of. When he (Mr. Fisher) first tested him the patient alleged that the right eye could do no better than count fingers at very short range. The left eye had the full acuteness of sight. There was no inequality in the response of the two pupils to light, and ophthalmoscopic examination revealed no change whatever in the eye complained of. By manipulating lenses before the left eye while the right eye was uncovered and, without the knowledge of the patient, using a convex lens before the left eye of sufficient strength to exclude its distant vision, the right eye read  $\frac{6}{6}$ . He then demonstrated to the patient that he had been seeing the bottom line on the test board with the right eye; he was struck by the undoubted surprise of the patient and was quite convinced that he was not a malingerer. The patient was certainly surprised, if not pleased, to discover that he could see so well with the eye which he had considered was so defective. He encouraged him to expect that he would obtain a full recovery of sight, pointing out that the patient was himself already recognising an improvement, and that he probably was going to progress more satisfactorily and rapidly than might have been anticipated, and that he could confidently



expect all sight to be restored. He entirely agreed with Mr. Parsons that these cases should be treated sympathetically and the patients not upbraided, if a good result was to be obtained.

Dr. FARQUHAR BUZZARD considered Mr. Parsons's paper to be a valuable contribution to their knowledge not only of the psychology of traumatic amblyopia, but of the psychology of the traumatic neuroses of all kinds. There was no essential difference between these cases of amblyopia following shell explosion and the various forms of hysterical deafness, mutism and paralysis which they were seeing so commonly in connexion with this war, and which they saw in somewhat smaller numbers during peace time in connexion with the Workmen's Compensation Act. Mr. Parsons had discussed the situation of a possible block in the visual paths in these cases of hysterical blindness, but Dr. Buzzard was unable to agree with him when he suggested some spot between the mid-brain and the occipital cortex as the site of such a block. It was impossible to give an anatomical localisation for a disturbance which was purely mental and belonged to the region of ideas. While it was true that all these cases demanded not only their interest but their sympathy, and that in the large majority the application of the term "malingering" was grossly unjust, from a scientific point of view there was no hard-and-fast line between cases of pure hysteria on the one hand and cases of malingering on the other, if they regarded the former as at one end of a scale and the latter at the other end, and realised that they met with cases showing all the intermediate stages between the two extremes. The only difference between pure hysteria and malingering was probably a matter of the degree to which the "wilfulness" to be blind or deaf or mute was buried in the depths or flourished on the surface of consciousness. They were all aware how difficult it was to discriminate between what they called "functional" and "malingering" sometimes, and their judgment and verdict was often biased by their personal feeling towards the patient. If his manner and bearing attracted one he was suffering from a functional disorder. If he was peculiarly unprepossessing he was almost sure to be a malingerer. They ought to recognise and to admit to themselves that the two things were very near akin, just as their treatment of the two conditions was practically identical. A patient suffering from mutism after exposure to shell explosion at present under Dr. Buzzard's care was such a nice fellow that no one could call him anything but a case of functional or hysterical mutism. At the same time one had to admit that his only successful attempt to speak for some time after his admission to hospital was when he blurted out his conviction that he would rather be dumb for the rest of his life than return to the Front.

Mr. LESLIE PATON expressed his great indebtedness to Mr. Parsons for his lucid exposition of an extremely difficult subject. Few things were more important at the present time than a proper appreciation of the difficulty of distinguishing between malingering and a true disturbance of function, and there was grave danger of many cases being regarded with unjust suspicion or



even being set down as definite malingerers. The speaker's own experience was not sufficiently great to allow him to discuss in general terms, but he would quote one case which seemed to him to illustrate the necessity for reviewing the history of the patient in detail. A private in a Scottish regiment quartered at Salisbury had been kicked on the left side of the head by a horse. There had been a considerable contusion and, no doubt, a black eye. Six weeks after the injury his doctor sent him up to see Mr. Paton on account of the loss of sight in the left eye. On examination, the speaker could find nothing in media or fundus to account for loss of sight. His optic nerve was healthy and he found that, by appropriate tests, the vision of the left eye was quite as good as that of the right eye. Now, at first sight, this seemed malingering pure and simple, but the general attitude of the man did not bear out that impression. On going into the history, Mr. Paton found that he was a married man with a family of eight children, the eldest being a boy of fourteen. He had a small general dealer's shop in Glasgow, and when he enlisted in August this shop had been left in charge of his wife and this boy. At the time of the accident, and ever since, he had been in a state of anxiety as to how the business and the family were getting on, and the speaker thought this mental condition and the accident had determined a solution of continuity somewhere, and, as it was mental, he referred the loss to the injured side. Mr. Paton felt that he was rash in giving an opinion before that audience as to where the solution of continuity took place. From the history of most of these cases it was obvious that there was no break between the eye and the visuo-sensory cortex. But until they reached some explanation of the problem of the relationship of physiological to psychological changes they must consent to remain in the dark. In these cases the break must, he thought, be in the highest link of the chain.

Dr. FEILING said that he had treated by hypnosis a case which resembled those under discussion. The patient was a young soldier, who at the end of October 1914 was buried in a trench, where he remained for fifteen hours before being dug out. For five days after he was deaf and dumb. He then "came to himself," as he expressed it, and found himself in Manchester. He had lost all recollection of his previous life entirely and had to learn to speak, read and write again; he learnt very quickly. At the end of January he came under the speaker's observation at the Hospital for Nervous Diseases, Maida Vale, where Dr. Campbell Thomson kindly gave the speaker the opportunity of seeing him. By that time he had rapidly regained the power of reading, writing, and speaking, and to all appearances was a perfectly normal individual until he was questioned on events of his previous life. He was still completely amnesic with regard to all events previous to his reawakening in Manchester. All persons and objects which he had not seen since that date were quite unrecognised by him. Thus he did not recognise his parents but took them on trust, as he had been told that they were his parents. All attempts to catch him out in any mistake were unsuccessful. He proved an excellent subject

for treatment by hypnotic suggestion. Under hypnosis he would readily answer all questions as to his previous life, and gave the speaker full and vivid details of experiences of fighting in Flanders, where he was one of the 7th Division which tried to relieve Antwerp. So far all attempts to associate these two states had been quite unsuccessful. It was thought it might be possible to do so by making the patient write down, while under hypnosis, answers to questions, and subsequently showing him what he had written. This was done. But rather to the surprise of the observer the patient declared that the answers were not in his handwriting; and a comparison between his hypnotic writing and his ordinary writing certainly showed some difference. When in the state of hypnosis the patient believes that he is in Manchester, that he has only just been sent back from France, and that the time is November. In this state he has spontaneously recognised his father with a degree of affection quite absent in his usual state; this spontaneous demonstration of affection was so marked that his father thought for a moment that his son had "come right again." Dr. Feiling said he would be glad to have any suggestions as to how the association between the two states might be brought about.

Dr. CRICHTON MILLER said he had listened with great pleasure to Mr. Parsons's most interesting paper and the subsequent discussion. The psychology of post-traumatic amblyopia was, of course, the same as that of any other phenomenon of dissociation—as, for instance, post-traumatic amnesia, aphonia, &c. Dr. Farquhar Buzzard had suggested that there was no difference between such a condition and one of malingering. It might be difficult or even impossible to determine the line of separation, but theoretically it must always exist, in that the mental mechanism in the one case was conscious and in the other unconscious. It was therefore unjust to imagine that by a conscious effort of will the victim of dissociation symptoms could terminate his trouble. With reference to the interesting case described by Mr. Leslie Paton, Dr. Miller would like to point out that the symptoms were rightly attributed to anxiety to return home; they were not technically produced by an anxiety mechanism, but by a defence mechanism. That is to say, that the symptoms served to "defend" the patient from the obligation that stood between him and his aspiration. It was desirable in this connexion to note that all dissociations could be produced either by a defence or anxiety mechanism. That evening they had had examples only of the former variety. Dr. Miller ventured to describe briefly a case of the latter, which, occurring in connexion with the war, was unusual. A young lieutenant on a destroyer, lying in port about the middle of July, went ashore. Playing tennis, he sprained his ankle and was laid up in hospital. When the fleet mobilised he was still unfit for service and his flotilla sailed, leaving him behind. He developed amnesia, aphonia, and agraphia after hearing this. In other words, the dissociation occurred as a result of his intense desire to rejoin his ship and as the direct consequence of a conflict between aspiration and reality which created an intolerable mental situation.

## Neurological Section.

May 13, 1915.

Dr. H. G. TURNEY, President of the Section, in the Chair.

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### Myopathy. Simple Atrophic Type.

By F. E. BATTEN, M.D.

*Case I.*—G. S., female, aged 5, fifth member of a family of eight children, four of whom are affected in a similar manner. A healthy, full-term, bright and happy child. Never able to stand or walk; can sit up; gets about on her buttocks; can move arms and legs in all directions; general weakness, marked hypotonus, loose shoulders. Legs cannot be fully extended at the hip, owing to contraction of flexor of hip; lordosis produced if an attempt is made to straighten the legs. All deep reflexes absent. Electric reaction: All muscles tested react well to faradism and galvanism; weak currents used (reaction done under chloroform). Cerebrospinal fluid normal. Wassermann reaction negative.

*Case II.*—H. S., female, aged 3, sixth member of the family. Condition the same as in her sister.

A younger child, aged 2, is said to be similarly affected. An elder brother, aged 7, was similarly affected and was in the National Hospital, Queen Square, for many months. He improved to a very great extent and could walk about. He is said now to go to school. This boy was shown at the International Congress of Medicine in 1913.

The two striking features in these cases are: (1) The large amount of recovery which has taken place in the first case; (2) the active electric response of the muscles to faradism.

**Myopathy. ? Juvenile Type. ? Landouzy-Dejerine Type.**

By F. E. BATTEN, M.D.

THREE members (the third, fourth, and fifth) of a family of six children are affected. The first (a girl) never walked well, and at the present time shows a marked weakness of the muscles of the shoulder and pelvic girdles.

*Case I.*—A. W., male, aged 12. Walked well till aged 5, when weakness began and has slowly progressed. There is wasting and weakness of the shoulder girdle muscles, and to a less extent of the pelvic girdle muscles. He can sit up well and gets up from the floor with ease. The most striking features are the lordosis when he walks and the oscillation to and fro of the lumbar spines. Knee-jerks active. Ankle-jerks active. Abdominal reflexes active. Plantar reflex flexor. Blood: Wassermann reaction positive. Cerebrospinal fluid normal; Wassermann reaction negative.

*Case II.*—N. W., male, aged 10. Weakness began at the age of 5, and has slowly progressed. He shows the same weakness as his brother, and walks in a similar manner; there is rather more winging of the scapulæ and greater weakness in lifting the arms. There is marked *fibrillary tremor* in the muscles of the shoulder. Blood: Wassermann reaction doubtful. Cerebrospinal fluid normal; Wassermann reaction negative.

Dr. JAMES COLLIER said that the very interesting cases that Dr. Batten had shown as examples of a simple atrophic type of myopathy were of the same class as the many cases which had been described under the term "amyotonia congenita." He had always contended not that such cases were in no relation with the myopathies, but that they constituted a distinct and characteristic clinical type. Though the condition of the muscles in this disease closely resembled that found in the myopathies, it was yet possible that the same end-result in the muscles might result from more than one pathogenic condition. The improvement and the return of the knee-jerk in another affected member of this family was remarkable, and was a point that Dr. Batten had himself contested in former years. He had noticed improvement and return of the knee-jerk in many cases, but the improvement had never nearly reached the attainment of full bodily capacity. In his experience it was the minority of the cases which showed improvement, while

some showed an interrupted downhill course. Some of the cases were certainly not congenital, but the symptoms developed after a certain period of healthy existence. Some of the early severe and progressive cases were difficult to distinguish from cases of Werdnig-Hoffmann paralysis.

### Case of (?) Amyotonia Congenita.

By JAMES COLLIER, M.D.

R. S., AGED 5, commenced to walk at the age of 16 months, but has never walked properly. He has always been very weak, clumsy and tottering on his legs, and has never been able to run. Has always had difficulty in assuming the upright position, and has dragged his feet with the ankles in-turned. The other children of the family are healthy and no case of similar illness has occurred. The musculature is small, but there is no local wasting. The response of the muscles to faradism is everywhere low, and strong faradic stimuli are easily tolerated. There is considerable hypotonus of the muscles of the legs, especially noticeable in the ankle. All the deep reflexes are very difficult to obtain. There is no deformity. He has difficulty in sitting up from the supine position. He attains the erect position by climbing up his knees. The knees often give way and let him down in walking. He uses the left foot as if he had a peroneal paralysis. He cannot run. He improved considerably in hospital with rest and exercises.

### Case of Pontine Polio-encephalitis.

By JAMES COLLIER, M.D.

E. B., AGED 8, was taken suddenly ill on January 18 with headache and fever. During the following two days he had a series of convulsions, vomited repeatedly, and was subconscious. Subsequently he was noisy and restless for a few days, and then seemed quickly to recover, except that he was completely deaf and was very unsteady upon his legs.

He was completely deaf when he was examined on February 16. Ears normal. He talked and obeyed written orders very intelligently. Vibration sense present; nystagmus; bilateral ataxy; titubation; cerebellar gait. Lumbar puncture normal. Wassermann reaction negative.

Under observation the cerebellar signs have practically disappeared, leaving complete deafness as the feature of the case.

**Obesity ; Epileptiform Attacks ; Recurrent Jaundice in  
a Girl, aged 13.**

By E. G. FEARNSIDES, M.D.

E. C., FEMALE, born November, 1901.

Family history: There is no family history of neuropathy or obesity, and her parents, who married in 1894, are healthy and rather below the average in size and weight. The patient is the second of two children, and her brother, born in 1896, is healthy.

Personal history: At birth she was a fine large baby, and since the age of 7 has always been "too large for her age." Her only illnesses have been measles at the age of 3, mumps at the age of 5, and whooping-cough at the age of 7. At the age of 9, after a fall down some steps, in which she hurt her head, her weight began to increase rapidly. Since April, 1913, she had been "subject to fits," and in April and November, 1913, and on January 18, March 30 and April 20, 1915, suffered from typical epileptiform convulsions. The attack of March 30 occurred whilst the patient was under observation in hospital. In each attack she has been convulsed, lost consciousness, become cyanosed; on three occasions she has bitten her tongue, and in one has fallen and cut her cheek. The attacks are followed by drowsiness and intense frontal headache, and on two occasions have led to vomiting. After each attack for a day or more she has been irritable and excitable. She was backward at school, and when she left in April, 1913, had only reached Standard IV. Since the onset of the attacks her memory has become defective, and she is "no longer the bright girl she was." Catamenia began in May, 1914, and occurred regularly in June, July, August and September, 1914, and again in March and April, 1915; on the last two occasions the loss was excessive and continued for seven days. From time to time since February, 1915, she has "gone yellow," and since this date definite bilious staining of the eyes has been observed on several occasions. On March 5 she was definitely jaundiced, and bile was present in the urine in large quantities, but at no time has she complained of abdominal pain or exhibited any abnormal abdominal signs. Her weight on February 5 was 11 st. 13 lb., and by February 19 had increased to 12 st. 2 lb.; since this time she has been taking thyroid extract (2½ gr. daily) and her weight has fallen to 11 st. 3 lb.



The patient is an extremely stout, thickly set girl. The skin is moist and everywhere stained a light brown colour. The mucous membranes appear healthy. There is a well-developed pad over the lower cervical spinous processes and small supraclavicular pads are present, but on the whole the excess of fat is distributed over parts which in girls about the time of puberty usually show a superabundance of fat. Over the lower parts of the abdomen and upper parts of the thighs well-marked striæ of a white or pink colour are present. The veins over the lower abdomen are prominent. The axillary and pubic hair is well developed and that of the scalp normal. The breasts are large and well developed. The thyroid is small. The bones of the head, trunk, and limbs appear normal, and there is no evidence of any delayed union of the epiphyses. A skiagram of the skull taken in February, 1915, shows a clear-cut sella turcica of normal outline and dimensions. She is not anæmic, and a blood count shows red cells 5,600,000 per cubic millimetre, hæmoglobin 106 per cent., and 17,500 white cells per cubic millimetre, with a normal differential count. The voice is natural.

The cardiac sounds are clear. The blood-pressure in the right brachial artery measures 125 mm. of mercury. No abnormal signs are present in the lungs. The liver and spleen cannot be felt and to percussion are not enlarged. No abnormal lumps can be felt in the abdomen. The urine contains neither albumin nor sugar; the average quantity passed in twenty-four hours is 36 oz.

Mentally she is dull and slow. She sleeps heavily and is not troubled with dreams. Apart from the epileptiform attacks she suffers but little from headache. There is no pressure tenderness of the scalp. Vision is unimpaired and the optic disks appear healthy. Smell, taste and hearing are unaffected. Ocular movements are well carried out, and there is no nystagmus. The pupils react normally to light and accommodation. The functions of the other cranial nerves are performed naturally. The knee-jerks and ankle-jerks are brisk, and the abdominal reflexes readily obtained. Both plantar reflexes give a flexor response. The movements of the spine are normal and the action of the sphincters controlled.

#### DISCUSSION.

Dr. LEONARD GUTHRIE considered the case an anomalous one. The obesity did not conform with the type met in cases of hypopituitarism (*dystrophia adiposo-genitalis*), because sexual hair was present, and development of sexual organs and menstruation were normal. The obesity was

unlike that seen in cases of suprarenal cortical tumours, wherein it resembled the obesity of elderly people. Moreover, in cases of hypernephroma corticale there was usually general hirsuties with precocious sexual or physical development, or both, which were absent in the present case. Two instances had been recorded of precocious sexual and physical development associated with tumour of the pineal gland, but as far as the speaker was aware, excessive obesity had not been noted as a symptom of pineal tumour. The obesity in the present case might perhaps be described in Sir James Goodhart's words as "a normal abnormality."

Dr. F. PARKES WEBER remarked on the great variety in the clinical aspects of pituitary and "polyglandular" syndromes. Dr. Fearnside's patient did not appear very abnormal at present, but there was a possibility of her case developing into one of what Dr. W. M. Kraus had recently termed "Pilous Cerebral Adiposity."<sup>1</sup> Kraus's case was that of an obese, hairy man, aged 31, subject to attacks of drowsiness or "narcolepsy," and exhibiting extraordinarily high tolerance for dextrose. "Hypersomnia" was characteristic of "hypopituitarism," and was likewise sometimes associated with tumours of the pineal body. In Kraus's case there was slight polycythæmia (the red cells numbered 6,720,000 in the cubic millimetre of blood). There was likewise a slight tendency to polycythæmia in Dr. Fearnside's case, and in a patient with a remarkable type of polyglandular syndrome (Miss A. O.) described by Dr. H. G. Turney at the joint meeting of the Sections of Neurology and Ophthalmology on March 12, 1913,<sup>2</sup> there was at one stage of the disease very decided polycythæmia.

### Case of (?) Neoplasm of the Spinal Cord ; Lesions of Eighth Cervical and First Thoracic Nerve Roots.

By E. G. FEARNSIDES, M.D.

(For Dr. PERCY KIDD.)

F. B., FEMALE, born April, 1891. The patient is the second child of a family of seven children, all of whom survive and are healthy. In 1901 she had an attack of diphtheria and in 1912 suffered from a "septic mouth and dental neuralgia," otherwise until the autumn of 1914 her health was uniformly good. Towards the end of November, 1914, she had a "bilious attack" and suffered from vomiting and headache, followed a few days later by sore throat and severe pains in the legs. On December 15, 1914, she began to complain of severe pains in her lower abdomen and for three days vomited continuously. On December 26

<sup>1</sup> *Amer. Journ. of Med. Sci.*, 1915, cxlix, p. 737.

<sup>2</sup> *Proceedings*, 1913, vi, p. lxx.

she first complained of pains in her back, shoulders and neck and became unable to turn in bed because of "stiffness and pain in the shoulders." On December 31 "something went wrong with her elbows" and she began to suffer from shooting pains in the muscles of her forearms, arms and hands. The pains were chiefly on the ulnar side of the extremities and were worse on the left side than on the right. She became "unable to rest her elbows in bed, for they felt like blocks of wood." Since this time she had never been free from aches and pains in her upper extremities. During the months of January and February the pains seemed to leave the arms and pass into the fingers, and her hands began to sweat. On January 21, 1915, she found that the small muscles of the left hand were wasted, and shortly after this observed that the right hand was becoming similarly affected. From December 1 until the middle of February she remained in bed. On getting up she found that she could not hold her water so long as she had been able to do before the onset of this illness. About the end of December, 1914, she first experienced difficulty in feeling objects—"I could not pick things up and when I held them in my hand I could no longer feel their nature." On March 8 she was sitting by the fire warming her hands and on taking them away found to her astonishment that she had burnt and blistered her left index and middle fingers without feeling any pain or discomfort. Since March fibrillary twitchings of the muscles of her upper extremities have been extremely noteworthy features. At the onset of the illness she slept badly and was very "worried in herself." Since the middle of December she has never vomited and her head has never ached.

The patient is a well-covered woman of healthy appearance. In the heart, lungs, abdomen, and urine no abnormal signs are present. The Wassermann reaction in the serum is negative. The special senses are unaffected and the optic disks and fundi appear healthy. The left palpebral fissure is slightly wider than the right. Ocular movements are well carried out and there is no nystagmus. Both pupils react briskly to light and to accommodation, and both pupils dilate fairly to shade. There is no abnormal sweating over the face. The movements of the jaws, palate, larynx, face, and tongue are unaffected. Gait is little affected, she walks fairly and can climb upstairs. Romberg's sign is not obtained. There is grave weakness of both upper extremities. With the left hand she has no power of flexion and cannot form a fist. She can make most movements with the right hand, but their power is very defective. She writes well, but complains that when she is

writing the two ulnar fingers and the ulnar side of the palm "get in the way." When the right hand is cold she is unable to make any movements with it. Pronation and supination can be carried out on both sides, but complete pronation on the left side leads to a complaint



FIG. 1.

The parts insensitive to pain, heat, cold, and cotton-wool are lined, and the parts over-reacting to sensory stimuli are dotted.

of pain in the ulnar side of the arm and forearm. She can move the elbows fairly and the shoulders freely. There is gross wasting of all the intrinsic muscles of both hands; this is more intense on the left side. The left wrist is dropped. All the fingers of the left hand are

dropped and the right little finger is hyperextended at the metacarpophalangeal joint and flexed distally. The muscles of the forearms, arms and shoulders are relatively better developed, but the lower parts of the pectoralis major and the serratus magnus muscles on both sides

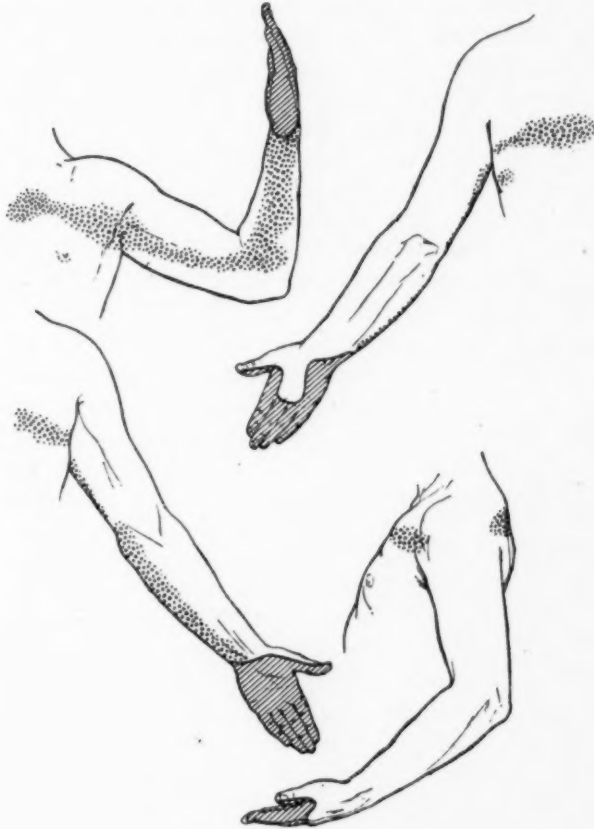


FIG. 2.

The parts insensitive to pain, heat, cold, and cotton-wool are lined, and the parts over-reacting to sensory stimuli are dotted.

are paretic. There is no paralysis or paresis of the legs or of the muscles of the trunk or of the neck. The tone of the muscles of the leg is normal. Fibrillary twitchings have been observed from time to time in the muscles of both forearms.

Dr. Woods reports that of the intrinsic muscles of the left hand some show complete R.D., others mixed reactions; on the right side one dorsal interosseous muscle shows complete R.D., and the other muscles supplied by the ulnar nerve mixed reactions. The muscles on the front of the left forearm, except the flexor carpi ulnaris, show no response to faradism and a sluggish response to galvanism, and on the front of the right forearm normal reactions. The skin of the left hand is thin, smooth, glossy, and shiny. The left palm has lost all expression and sweats freely. The skin of the right hand is less abnormal; it is moist, clammy, cold, and tends to be blue. On April 10 scars of painless burns were present on the tips of the left index and left middle fingers. The nails on both hands are elongated, brittle, and have horizontal ribs. The elbow-jerks on both sides are feeble and neither wrist-jerk can be elicited. The knee-jerks and ankle-jerks are not exaggerated and ankle clonus cannot be obtained. The plantar responses are more difficult to elicit than formerly, but on both sides a flexor response is obtained. The abdominal reflexes on both sides are normal. The sphincters are controlled, and since the patient has been kept in bed frequency of micturition is no longer troublesome. There is no definite spinal deformity, and on April 26 a radiographic examination failed to reveal any changes in the bones of the lower cervical and upper thoracic vertebræ, and gave no evidence of the presence of cervical ribs.

She complains of sharp, shooting, momentary, not really severe, pains down the inner side of the arms, forearms and hands, and of a feeling of "tightness as if the hands were gripped and squeezed and the nails turned into the flesh." On admission, on April 7, she also complained of a tightness across the upper part of the chest, which under rest has entirely subsided. She cannot recognise and name common objects placed in either hand after the closure of her eyes. Objects held in her right hand fall out of the hand "when she is not looking." Over the free parts of the fingers, the whole of the distal three-quarters of the palm, the palmar aspect of the thumb and the ulnar side of the dorsum of the left hand, and over the ulnar portion of the right hand, she is unable to recognise any form of sensory stimulus. Over these areas sensibility to pain, heat, cold, and cotton-wool is completely abolished, and the boundaries of the losses to these forms of sensibility are almost identical and coterminous. Over the ulnar aspects of both wrists, forearms, arms, and axillæ the skin over-reacts to the prick of a pin, to the dragged point, and to pinching,



"a prick seems 'sharper,' 'all over the place,' and the skin feels sore." On April 10 the over-reaction was more widely spread and extended both on to the front and back of the chest. Over the lower half of the inner side of the forearm before any stimulus is appreciated that stimulus must be applied with greater force; here there is some loss of sensibility to painful stimuli together with hyperalgesia. Elsewhere over the head, neck, trunk, and lower extremities no sensory disturbances are present.

Dr. JAMES TAYLOR remarked that the question was purely a practical one—whether an exploratory operation should be performed or not. He himself felt that such an operation should be undertaken at once, and subsequent conditions dealt with as might seem to be necessary.

*Postscript.*—The patient was kept at rest in bed and treated with massage until June 4, but no changes in signs or symptoms occurred. On that day Mr. Walton operated. The laminæ of the fourth, fifth, sixth, and seventh cervical and first thoracic vertebræ were removed. The dura and its contents appeared natural and pulsated well. The dura was incised and slit up for the whole length of the wound. No abnormalities of roots, spinal cord, meninges, or vessels were discovered. The exposed portion of the spinal cord was of normal size, and by palpation no softening or other gross change could be detected.

### Case of Astereognosis of the Left Hand.

By WILFRED HARRIS, M.D., and E. G. FEARNSIDES, M.D.

H. M., FEMALE nurse, aged 31. About November, 1914, she noticed that she became easily tired. In January, 1915, she became subject to a dull ache in the back of the shoulders, in the axillæ, and down the inner side of the upper arms, forearms, wrists, and hands. She says that at this time "the upper limbs felt as if they were tired, pulled out, heavy, and asleep, and towards evening quite useless." Since January the arms have got gradually weaker and more powerless. About March, 1915, she first noticed that the left hand was numb, "and whenever I could not see the hand I did not know what it was doing." She became unable to button the back of her apron, and could no longer feel with her left hand to tidy her hair. The ulnar two fingers would catch in everything. She became unable to hold a fork in the ordinary fashion and must take it in her clenched fist. She could no

longer help in turning or lifting a patient, and lost her skill with her left hand. Her general health has been uniformly good. She has complained of no acute pain, has not been subject to headache, has never vomited, and sleep has been little affected. Walking, and the feeling, and power of control over the lower extremities, have never been affected. The patient is one of six healthy living children. There is no family history of neuropathy. Her mother died of phthisis, and her father after a cerebral hæmorrhage.

The patient is a well-covered, happy, contented, attentive woman, who does not look more than her age. Speech is not grossly affected. She has never suffered from convulsions or other form of seizure. Headache has not been a noteworthy feature; she has not suffered from nausea or vomiting. Memory and mentation are clear. She sleeps fairly, but is now subject to "starts," and to "feelings as if she were falling through space." Vision and the visual fields are normal, and the optic disks and fundi appear healthy. Hearing is unaffected and equal on the two sides. Smell and taste are normal. The pupils react readily to light and to accommodation. Ocular movements are unimpaired, and there is no ptosis and no nystagmus. The movements of the jaws, face, palate, tongue, and larynx are normal. Gait is unaffected, and Romberg's sign is not obtained. With the eyes open she experiences great difficulty in bringing the fingers of her left hand into alignment, the two ulnar fingers tend to drop away and "must be constantly brought back into place." When the hands are held outstretched in front of the patient the whole of the left upper extremity falls into a posture of weakness. At the wrist the left hand can be dorsiflexed to a greater extent than the right, and the muscles of the left forearm show some degree of hypotonia. The left ring-finger can be dorsiflexed to a greater extent than any of the other fingers. There is little hypotonia at the left elbow-joint. The tone of the muscles of the legs is normal. The muscles of the left hand are somewhat smaller and less firm than those of the right, but there is no definite local muscular wasting. The left grasp is feeble; with the eyes closed the left grasp is almost imperceptible and cannot be sustained. Involuntary drawing-up movements of the legs have never been troublesome, and fibrillary twitchings have not been observed in the arms. The left hand is always cooler and moister than the right, often this hand is covered with globules of sweat. The nails of the hand appear normal, but the patient states that the nails of the left hand grow faster than those of the right. The wrist- and elbow-jerks can be obtained and are about

equal on the two sides. Both knee-jerks are exaggerated. The ankle-jerks are extremely brisk, but ankle clonus has never been obtained. Abdominal reflexes are difficult to elicit and the lower abdominal reflexes have never, with certainty, been obtained. Since the patient first came under observation in April, 1915, the plantar responses have varied: on April 22 both were stationary; on April 26 both were sluggishly flexor; and on May 8 the right was definitely extensor and the left indefinitely flexor. The sphincters are controlled and the movements of the spine unimpaired. There is no tenderness to pressure over the lower cervical and upper thoracic spines. The Wassermann reaction in the serum is negative. In the heart, lungs, abdomen, and urine, no abnormal physical signs are present.

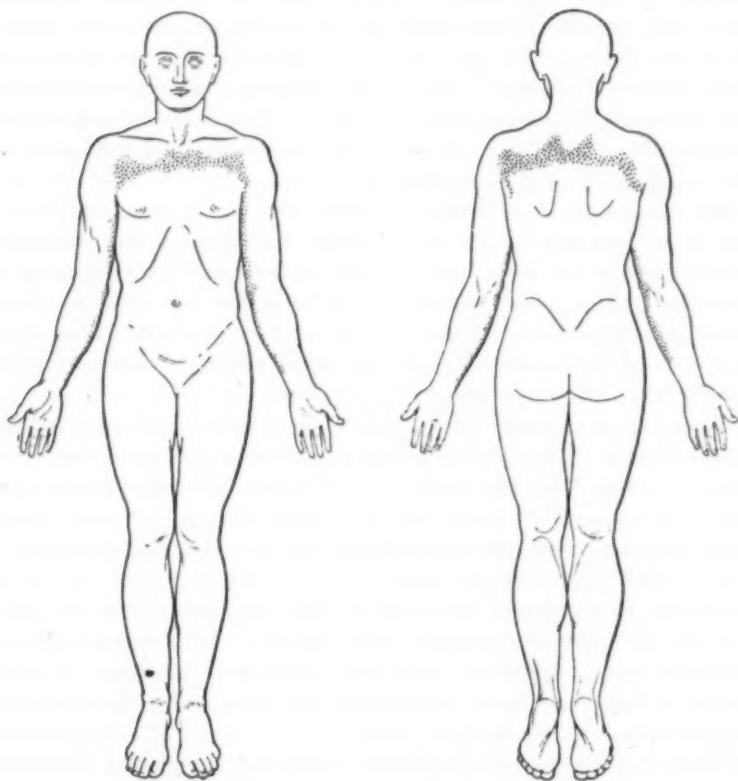
She complains (1) of a dull, constant ache down the inner side of both upper extremities; (2) of a feeling of numbness and clumsiness of the whole of the left hand, greater on the ulnar half than on the radial side; (3) a loss of the ability to recognise the form of objects which she holds in her left hand. For a period of about a week during the month of February, 1915, she also complained of some paræsthesia over the left half of the scalp.

With the eyes closed she is unable to recognise and name common objects placed in her left hand (e.g., a watch, penny, half-a-crown, scissors); when they are placed in her right hand she answers both readily and correctly. With the left hand she can feel that both a sphere and an ovoid are "rounded," but she cannot distinguish the sphere from the ovoid or from a cone. She is unable to tell the number of small objects she holds in the left hand. She can appreciate the fact that test objects have "corners," but cannot distinguish a cylinder from a pyramid. She cannot tell the difference in feel of a piece of blanket, a sheet, and a piece of cloth. She cannot estimate weights with her left hand.

There is gross loss of the power of appreciating passive movements of the fingers and wrist on the left side, and slighter loss at the left elbow. Before any movement of the left little finger is appreciated the joint must be moved through an angle of  $17^{\circ}$  to  $22^{\circ}$ , whilst she appreciates a movement of the right little finger of about  $5^{\circ}$  to  $7^{\circ}$ . There seems to be some impairment of the power of recognising passive movement over the distal portions of both upper extremities. The patient finds the fingers of the right hand with the left with fair ease, but cannot find the fingers of the left hand with the right. The fingers of the left hand, when the eyes are closed, fall away and form

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a loose fist. Small objects grasped with the left hand cannot be retained when the eyes are closed. "If I look at my left hand I can use it and know what it is doing, but if I do not see it things drop out of the hand and the hand seems perfectly useless."



When the patient is tested with the vibrations of a tuning-fork ( $C = 128$ ) no difference in the sensation evoked, either in the intensity of the sensation or in its duration on the two halves of the body, can be discovered. From the hands, wrists, elbow, knees, ankles and feet the patient states that the sensation is exactly the same. The answers obtained when the patient is asked to localise the point stimulated (by recording it on a full-sized diagram of the hands) are good and certain on

both hands. The patient is able to appreciate heat and cold, and can distinguish the difference between water at 10° C. and water at 18° C., and between water at 30° C. and 40° C. To testing with cotton-wool no sensory interferences of any kind are present. On the palmar aspect of the right thumb and over the ulnar side of the right palm an accurate record is obtained when the points of the compass are separated 1 cm., and on the palmar aspect of the right little finger at 2 cm. To obtain similar accurate records from the left hand the points must be separated to 2 cm. on the palmar aspect of the thumb, and to 3 cm. on the ulnar side of the palm, and to 3 cm. on the palmar aspect of the little finger. Over the left hand the prick of a pin elicits both pain and the sensation of pointedness, and these sensations are "exactly similar" to those obtained on the right hand. Over the inner side of the right and left forearms, arms, and over the upper part of the front and back of the chest, the prick of a pin evokes a sensation called "different, sharper, more acute." The areas over which this response is obtained are bilaterally symmetrical, and can be accurately mapped; they are shown on the diagrams. These areas seem to correspond to segmental areas, and to be in the main probably supplied by the second thoracic segment of the spinal cord. Pinching and the dragged point of the pin over these areas are also said to "hurt more." No interference anywhere in the power of appreciating pressure pain is present. Elsewhere over the rest of the trunk, over the head, and over the lower extremities, no changes in sensibility are present.

### **Paresis and Involuntary Movements following Concussion caused by a High Explosive Shell.**

By ARTHUR HERTZ, M.D.

PRIVATE M., aged 29, was knocked over by the explosion of a high explosive shell in December, 1914, and remained unconscious for two days. When he regained consciousness he found that he could not move his right arm or his left leg. Power in both limbs soon returned to some extent, but as soon as he tried to stand, violent involuntary movements occurred in his left leg.

I first saw the patient on April 1, 1915. His mental condition seemed to be impaired, he only answered questions after a considerable latent period, and his speech was slow. The whole of his right arm

was weak, the grip being particularly feeble. When he clenched his left hand an associated movement occurred in the right hand, but on clenching the right hand no similar movement occurred in the left hand. The muscles of both arms were equally well developed. The tendon reflexes in both arms were brisk, but were no better marked on one side than the other. The patient was unable to localise light tactile stimuli accurately, but otherwise there were no sensory disturbances. All movements of the left leg were somewhat weak. The muscles were equally well developed in both legs. Both knee-jerks were brisk, the left one being slightly brisker than the right. Well-marked ankle clonus could sometimes but not invariably be obtained on the left side. The plantar reflex was constantly flexor on both sides, but Babinski's second sign (combined flexion of the thigh and pelvis) was very well marked on the affected side. As soon as the patient attempted to walk, violent involuntary movements were set up in the left leg: the leg moved rapidly from side to side round the point where the toes were in contact with the ground. When a step forward was taken with the right leg, the left leg dragged behind and very irregular movements occurred. The gait seemed to be of so obviously hysterical a nature and the signs pointing to organic disease were so slight, that it was thought that all the symptoms would probably be cured by suggestion. The patient was kept in hospital for a month, but all efforts to cure him by means of suggestion entirely failed. He proved very easily hypnotisable, but even when deeply hypnotised the movements of the leg could not be controlled when he was told to walk. He is now in exactly the same condition as when he was first seen, except that his mental condition has improved to a slight extent.

The associated movement of the paralysed hand when the normal hand contracts, the slight exaggeration of the left knee-jerk and the tendency to ankle clonus, and above all the presence of Babinski's second sign, indicate that some organic changes have occurred in the brain as a result of the concussion. The complete failure of suggestion to produce any improvement raises the question whether all the symptoms, in spite of their unusual character, may not be organic in origin.

*Postscript.*—Dr. Batten suggested that etherisation might be of use, but the first whiff of ether had the effect of hypnotising the patient, and he is now (June 9) in exactly the same condition as he was when first seen on April 1.



PROCEEDINGS  
OF THE  
ROYAL SOCIETY OF MEDICINE

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VOLUME THE EIGHTH

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COMPRISING THE REPORT OF THE PROCEEDINGS FOR THE  
SESSION 1914-15

OBSTETRICAL AND GYNÆCOLOGICAL SECTION



LONDON  
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1915

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# OBSTETRICAL AND GYNÆCOLOGICAL SECTION.

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The Society does not hold itself in any way responsible for the statements made or the views put forward in the various papers.

## Obstetrical and Gynaecological Section.

October 8, 1914.

Dr. W. S. A. GRIFFITH, President of the Section, in the Chair.

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### Severe Hæmorrhage after the Menopause from Rupture of a Vein in the Endometrium.

By HENRY RUSSELL ANDREWS, M.D.

F. F., AGED 49, single, was admitted to the London Hospital on June 3, 1914. Her periods ceased in 1910, and there had been no bleeding for four years until May 21, 1914, when she had a very severe flooding, followed by a slighter amount of bleeding every day until she was admitted. She had noticed a swelling in the abdomen for several years, and had had some abdominal pain for about a fortnight. The patient was blanched, and had evidently lost a very large amount of blood. A softish swelling rose out of the pelvis to a point a few inches above the umbilicus. The cervix was normal, and on bimanual examination the swelling was found to be the body of the uterus, which evidently contained a large degenerate fibroid. I told the students that I could not explain the sudden very severe bleeding after four years' interval, and that we should probably find some unusual condition at the operation. After my examination she had a severe flooding which necessitated plugging the vagina, and administration of saline solution *per rectum*. I removed the uterus next day—a mass about the size of an adult head, containing a large soft degenerating interstitial fibroid. The tumour did not bulge into the cavity of the uterus, but this was greatly enlarged. Two dilated veins were seen on the surface of the endometrium, one of which had an opening in its wall plainly visible to the naked eye. When the uterus was squeezed, blood oozed out of this opening, and from no other point in the interior of the uterus. The opening was large enough to admit a piece of thick silkworm gut.

2      Giles & Lockyer: *Case of Ovarian Pregnancy*

I have seen a case of profuse hæmorrhage from rupture of a vein on the surface of a fibroid polypus, and several cases have been recorded where a vessel on the peritoneal surface has given way, but I think that rupture of a vein in the endometrium, large enough to be easily visible to the naked eye, must be rare, and that it is sufficiently interesting to be brought before this Section.

*Report of the Pathological Committee.*—The Committee report as follows on Dr. Russell Andrews's specimen showing a ruptured endometrial vessel. "We agree with the view that the hæmorrhage was due to a ruptured vessel in one of a number of telangiectatic patches occurring in a fibroid."

DISCUSSION.

Dr. HERBERT SPENCER called attention to a record of a similar case of Dr. Matthews Duncan, reported in the *Edinburgh Medical Journal*, 1867, p. 634.

Dr. ANDREWS, in reply to the President (Dr. W. S. A. Griffith), said that he had not cut sections of the ruptured vein, as this would have spoilt the specimen for demonstration. He promised to show sections at a later meeting.

**Case of Ovarian Pregnancy.**

By ARTHUR E. GILES, M.D., and CUTHBERT LOCKYER, M.D.

THE history of this case was as follows: Mrs. P., aged 32, consulted me in June, 1906, on the ground that she had been married for four years and had not become pregnant. She was very desirous of having a child, and wanted to know whether there was anything to account for her sterility. She stated that her general health was very good, that she had no leucorrhœa, and that intercourse presented no difficulties.

Menstrual history: Menstruation was regular, though seldom exact to the day; the quantity was moderate as a rule, but latterly it had been, if anything, too little. For one and a half to two years it had not been accompanied by pain. Further questioning brought out the fact that she had once missed a period—namely, in the previous January. Soon afterwards she suffered from sickness in the morning,



and she thought at the time that she might have become pregnant; but in February menstruation came on much as usual.

On vaginal examination, the uterus was normal in size and position; there was no undue ante flexion, and the cervix and external os appeared to be normal. On the right side of the uterus there was a rounded swelling about the size of a duck's egg. In view of the history, I expressed the view that it was a case of extra-uterine pregnancy, and advised operation. As the patient felt quite well, and had come merely to ask as to the possibility of pregnancy, the suggestion that an early operation was advisable naturally came as a great shock, and she and her husband very properly expressed the desire to obtain a second opinion. Accordingly, the next day she consulted Mr. (now Sir John) Bland-Sutton, who confirmed the diagnosis of an abnormal pelvic swelling, and endorsed the recommendation for an operation.

Three days later I operated, and on opening the abdomen found that the tumour was right ovarian; the right tube appeared quite normal, and the left ovary and tube were healthy. There were a few very slight adhesions round the ovarian swelling, and they gave no trouble. The affected ovary with its tube were removed, and the abdomen was closed. Convalescence was normal, and the patient left the home on the twentieth day.

I asked Dr. Cuthbert Lockyer to make a histological examination of the specimen, and it was soon evident that we had to do with a case of quite exceptional interest—namely, an unruptured ovarian pregnancy. Dr. Lockyer's description of the pathological and histological characters of the specimen, and the drawings of the specimen and of the microscopic sections, leave no doubt about the two facts that it is an ovarian pregnancy, and that it is unruptured.

The histological characters do not shed much light on the stage to which pregnancy had advanced, beyond the fact that it was early; but the clinical history indicates that the pregnancy probably terminated after three or four weeks, and that about five months elapsed between the occurrence of the pregnancy and the time of the operation.

In cases of tubal pregnancy, one of the most striking clinical signs is the scanty brownish discharge which is brought about by the disintegration of the uterine decidua as a sequence to the death of the embryo; it is of interest that in this case there was no history of any such discharge, nor of the expulsion of a decidua. Further, there was no history of acute pain such as accompanies the rupture of a tubal pregnancy.

Just over two years after the operation the patient obtained her long-cherished desire, and gave birth to a girl. The labour was quite normal. Since then there has been no further pregnancy.

Although cases of ovarian pregnancy have not the same element of novelty that they had in the early days that followed Mlle. Van Tusschenbroek's historical communication, they are still rare enough to warrant the publication of the present case; and I venture to think that this specimen is one of the most convincing among those that have been reported, from the fact that the ovarian capsule is unruptured, and that if this specimen stood alone it would constitute absolutely conclusive evidence as to the possibility of the occurrence of ovarian pregnancy.

REPORT ON DR. ARTHUR GILES'S SPECIMEN OF OVARIAN PREGNANCY,  
BY CUTHBERT LOCKYER, M.D.

The specimen consists of the right ovary, mesosalpinx, and Fallopian tube. The tube and mesosalpinx are quite normal, and devoid of adhesions. The tube is pervious to a bristle. The ovary is enlarged, and forms an oval sac about the size of a small hen's egg. It has a dark hue, its outer surface is ragged, owing to the attachment of filmy adhesions. The sac shows no sign of laceration or rupture, the outer roughened coat being entire.

The oval ovarian mass is of solid consistence; it resembles in appearance and solidity a good-sized peritubal hæmatocele. It is, however, entirely an ovarian structure, and the normal anatomical relationships to the tube and mesosalpinx are undisturbed.

The specimen was preserved in Kaiserling-Pick's solution and a coronal section made through the entire ovary, thus dividing the specimen into nearly equal halves. The measurements of the flat-cut surface are  $2\frac{1}{2}$  in. in the vertical and  $1\frac{1}{2}$  in. in the widest transverse diameter. A drawing has been made to show the characters of this cut surface (fig. 1, Coloured Plate). Attached to the mesosalpinx is seen a solid portion of ovarian stroma, measuring 1 in. by 1.75 in. Beneath this ovarian tissue, and lying in contact with it, is a hæmatoma measuring  $1\frac{1}{2}$  in. by 2 in. This blood-clot is everywhere surrounded by a capsule of ovarian substance. The latter is extremely thin in places, but nevertheless shows no sign of having been ruptured. The centre of the clot shows a transverse irregularly crescentic cleft. The walls of this space have a smooth glistening lining.



FIG. 1.

GILES and LOCKYER:  
*Specimen from Case of Ovarian Pregnancy.*



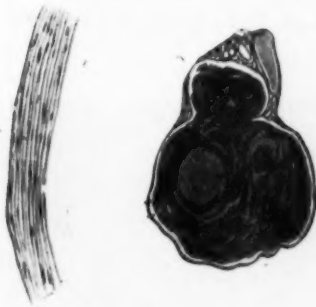


FIG. 2.

Showing the size of the smallest of a series of microscopic sections. The ovarian capsule is shown to be entire. The capsule is shown (on the left) under magnification  $\frac{1}{2}$  obj., No. 3 eyepiece. (Natural size.)



FIG. 3.

Showing large cleft seen in fig. 1. A degenerate foetal membrane forms the lining of the sac. No embryo could be found; it must have been absorbed. Hydramnios probably accounted for the large size of the sac. The shaded tissue represents blood-clot.

6      Giles & Lockyer: *Case of Ovarian Pregnancy*

The one half of the specimen has been cut into two portions by a transverse section through its meridian. From these two thick segments serial sections have been prepared by a large microtome, in



FIG. 4.

Showing the vesicular state of some of the villi. There is no syncytial budding. No Langhans's cells were seen. The villi lie in laminated fibrinous blood-clot.

the hope of finding some portion of an embryo in the crescentic cleft above referred to. No sign of an embryo was discovered, but the microscopic section revealed the following points:—



(1) The blood-clot is everywhere invested by a capsule of ovarian tissue (*see* fig. 2), showing no break in its continuity.

(2) The central crescentic cleft is lined by foetal membranes within which no embryo can be discovered (fig. 3).

(3) Ramifying throughout the greater part of the laminated clot are seen degenerate chorionic villi of large size. Some villi appear



FIG. 5.

Showing calcareous deposit in the blood-clot around some of the villi. It will be seen that these villi are near the ovarian capsule, but the latter is intact.

as stout fibrotic strands of tissue devoid of an epithelial investment. Others have undergone vesicular change (fig. 4): the mesoblastic core takes on a deep blue stain with logwood, which suggests the presence of mucin. Other villi are surrounded by a calcareous deposit (fig. 5). The mucoid degeneration of the chorionic connective tissue is not

accompanied by any sign of active growth on the part of the syncytium. Langhans's cells are not to be seen. The epithelial investment of the villi has throughout suffered from degenerative changes, and the general tendency is for it to disappear.

(4) Decidual reaction is well demonstrated in the stroma of the medullary portion of the ovary and also at the periphery (figs. 6 and 7).

Search has been made for lutein cells lining the capsule of this

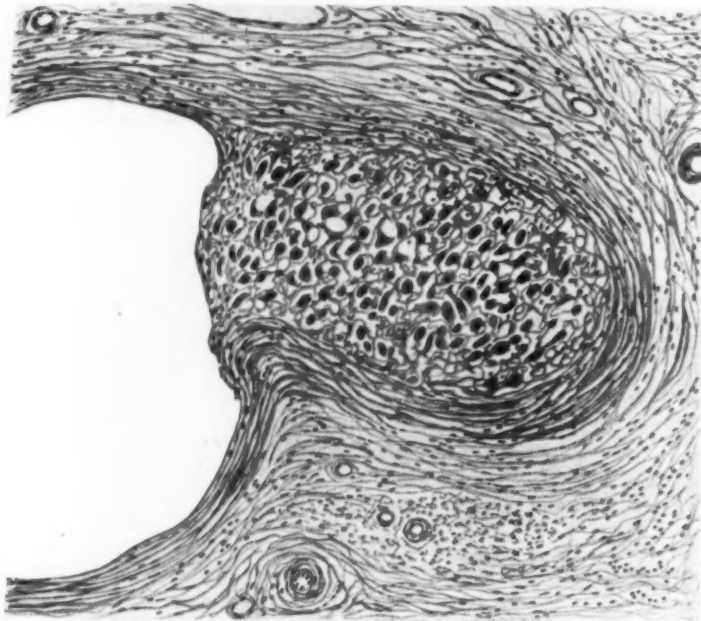


FIG. 6.

Showing decidual reaction in the connective tissue cells of the medulla of the ovary.

ovarian molar pregnancy, the fair assumption being that the gestation occurred within a ruptured corpus luteum. No lutein lamina, however, was found. Here and there a few compact areas of large swollen connective tissue cells were seen at the periphery of the blood-clot, but it was impossible to say whether these were decidual or lutein cells: the probability is that they are decidual.

The large size of the crescentic space which represents the collapsed

amniotic sac, the thickness of the foetal membrane by which it is invested, together with the large size and multiple branching of the chorionic villi, made it hopeful that an embryo of considerable size would be found; for it is difficult to imagine that the villi would continue to grow after death of the embryo. In the absence of the latter, histological speculation on the age of the pregnancy would be

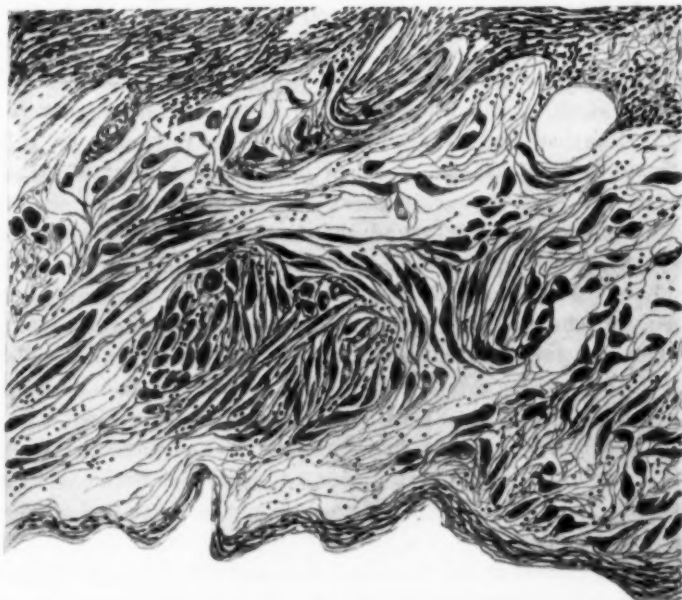


FIG. 7.

Showing decidual reaction of the connective tissue cells of the cortex of the ovary.

futile. The extensive degeneration, both mucoid and calcareous, which is seen in and around the villi, points to a considerable period of time as having elapsed between the death of the foetus and the date of the operation.

When the large size and extensive branching of the chorionic villi are taken into account, it seems surprising that no trace of rupture of the ovarian capsule can be found. The large size of the crescentic space surrounded by foetal membrane might be explained by the occurrence of hydramnios—a condition common to uterine moles, and

not infrequent in tubal moles—but it is rare in tubal gestation to find such a marked development of large branching villi in the absence of rupture of the investing tubal sac.

This case is undoubtedly one of unruptured molar pregnancy, occurring within the stroma of the ovary.

### Chorionepithelioma in a Woman, aged 50.

By ARTHUR E. GILES, M.D.

IN May of this year I saw, with Dr. Gurney Thompson, a patient aged 50. She had had nine children and four miscarriages, the last confinement (which was also the last pregnancy) being ten years ago. She stated that since the confinement she had not missed a period, and had not been even a day late, and that menstruation had been regular and moderate until the last three months; since then she had frequent slight losses. For a year she had been aware of a lump in the lower abdomen, and she described this lump as giving the sensation of falling over when she turned to either side. She suffered from constipation and flatulence, and for the last few weeks she had not been feeling well.

On examination the uterus was enlarged to the size of a four months' pregnancy; it was firm, with the consistency of a fibroid tumour. I made a diagnosis of uterine fibroid, and from the fact that the bleeding was only a recent feature I concluded that the tumour was mainly subperitoneal.

A few days later, at St. Thomas's Home, I did a hysterectomy. On cutting the uterus open afterwards, the tumour, which was the size of a large orange, was found to be intra-uterine: it presented a large dark mass, suggestive of a markedly necrotic fibroid tumour; but at the same time the appearance was not quite like any fibroid tumour that I had come across, and I sent it to Dr. Dudgeon for examination. I thought it possible that a sarcomatous change might have taken place in the tumour.

I was very surprised, in view of the patient's age, to receive this report from Dr. Dudgeon: "The tumour had invaded the entire wall of the uterus. It is a chorionepithelioma. Chorionic villi are present amongst the masses of malignant cells." I wrote to Dr. Dudgeon, expressing my surprise, and saying that I should like to see some slides, and to have the tumour, in order to show it at the Royal Society of

Medicine. Dr. Dudgeon kindly wrote to me: "I enclose two slides; I can send you more if you require them. The 'long' section only shows invasion with growth at one side and the tissue is obviously autolysing. The 'square' section shows the growth in all its stages most beautifully and also some well-defined chorionic villi. The growth had invaded the entire wall of the uterus as observed with the naked eye. I did not keep the specimen as no notice to that effect was sent, and also it was so badly exposed on the surface that I did not consider it any good for the museum. I only took many portions for microscopy, on the grounds that it was a sarcoma."

The circumstances attending the case were so unusual that I submitted the slides to Dr. Gordon Ley, Pathologist to the Chelsea Hospital for Women. He confirmed Dr. Dudgeon's view that it was a case of chorionepithelioma, and wrote: "I enclose a report on the slides, and conclusions, these being the joint views of myself and others to whom I have shown them. Apparently the St. Thomas's Hospital authorities mistook the decidua for growth also, as they state that both sections show growth; one, however, contains none. It is very extraordinary that pregnancy should occur at that advanced age."

Dr. Ley's careful report is as follows:—

"Two sections, 1 and 2: Section 1 is ragged and had probably not been cut absolutely at right angles to the surface. There is seen on the surface here and there a definite decidua compacta. This shows the typical mosaic of large pale-stained polygonal cells with central large rounded nuclei. Beneath this is a well-developed spongy decidual layer. This shows a stroma of fine collagen fibre and slightly swollen oat-shaped cells. Both these layers are infiltrated by lymphocytes. In the spongy layer, dilated, tortuous gland tubes, lined by a single layer of cubical cells, are numerous. The muscular wall of the uterus is normal. The individual fibres, however, are large. Section 2: This section again has probably not been cut at right angles to the surface. On the surface, at one point, are two villi. These show an extremely loose stroma of fine fibre and spindle cells surrounding a central cavity filled by granular debris. The villi are covered by a single layer of cubical cells with central round nuclei (Langhans's cells). Attached to the villi are multinucleate plasmodial masses of syncytium. Several other crumpled up, collapsed villi are seen. On these villi the cells of Langhans's layer are, at many points, in several layers, forming tongue-like processes. In these processes the cells are large, faintly stained, with large, deeply stained nuclei. These villi lie on, or are attached to,

a broad decidua compacta, the surface of which is covered in parts by masses of cells similar to those forming the tongue-like processes. The superficial layers of this decidua compacta are granular and necrotic. In the clefts and spaces in this layer there are large masses of atypical Langhans's cells (as described in the processes), and a few large vacuolated masses of syncytium. In the decidua, especially around these spaces, there are numerous isolated large polygonal cells similar to those in the spaces. Beneath the compact layer there is a well-defined spongy layer. Both these layers are infiltrated by neutrophile polymorphs and lymphocytes. The muscular wall is similar to that in Section 1.

"*Conclusions.*—Both sections show a well-marked decidua consisting of a spongy and compact layer. The uterus was, therefore, either pregnant at the time of operation, or had been extremely recently. The distended cystic villi suggest a vesicular mole. The proliferation of Langhans's cells, combined with the invasion both of the decidual spaces and of the decidua itself by these cells, is conclusive that the growth is malignant. It is either a malignant vesicular mole or a chorionepithelioma arising probably in a vesicular mole. The fact that the sections have not been cut at right angles to the surface makes it difficult to estimate the depth of invasion. The macroscopical report states that the body of the uterus was deeply invaded. Taking this for granted, the growth is certainly a chorionepithelioma."

A very interesting point in this case is the question, When did the pregnancy indicated by the chorionic villi occur? The pathological evidence suggests that it was recent; but there is no clinical history whatever of any pregnancy more recent than ten years ago; the patient is aged 50, and she stated that she had felt a swelling for a year. She stated further that no sexual intercourse had taken place since March of this year. I do not think that we have sufficient evidence to assign a date to the pregnancy.

I examined the patient on October 6, four months after the operation. There was no sign of recurrence, and the cervical stump was quite healthy.

*Report of the Pathology Committee.*—"We have examined the section submitted by Dr. Giles and are of opinion that it is of the nature of a malignant hydatidiform mole invading the uterine wall. In support of this view is the fact that definite chorionic villi exist in the section."



## DISCUSSION.

Mr. BLAIR BELL said that a hasty glance at the one section shown gave him the impression that the growth described was a chorionepithelioma. At the same time there were some difficulties in connexion with it. Firstly, there were some normal-looking villi which were not very old. This proved the connexion of the specimen—or the section of it shown—with a fairly recent pregnancy; but such facts were not in keeping with the history given. He called attention to a paper he remembered reading some time ago by an American obstetrician, the exact reference to which he could not remember at the moment, who found villi in the uterus of an old woman many years—eighteen, the speaker thought—after a confinement. There was no malignancy in that case, but it was one of considerable interest. The life-history of villi in the uterus subsequent to pregnancy and abortion was a question of importance, but one about which he had no definite knowledge.

Dr. GORDON LEY reiterated his statement that his diagnosis of chorion-epithelioma had been based in part, as far as the invasion of the uterine wall was concerned, on Dr. Dudgeon's report. His reason for thinking the pregnancy was recent was the presence of a well-formed decidua. He had that day seen a specimen in which a vesicular mole was present in the uterus with an area of growth in the uterine wall. This case, he thought, was similar to the one under discussion, with the exception of the presence of the mole.

**Puerperal Eclampsia ; Death due to Rupture of Subcapsular  
Hæmatoma of the Liver.**

By DONALD W. ROY, F.R.C.S.

THE patient was under the care of Dr. Fairbairn at the General Lying-in Hospital, York Road. She was sent to the Hospital by an outside doctor with the diagnosis of "albuminuria of pregnancy." She was aged 38, III-para.

Previous obstetrical history : First child born in 1909, healthy ; the patient had two fits (probably eclamptic) at her labour, but made a good recovery.

Second child born in August, 1910 ; normal pregnancy, labour and puerperium. Since then she had had a miscarriage at the third month of pregnancy.

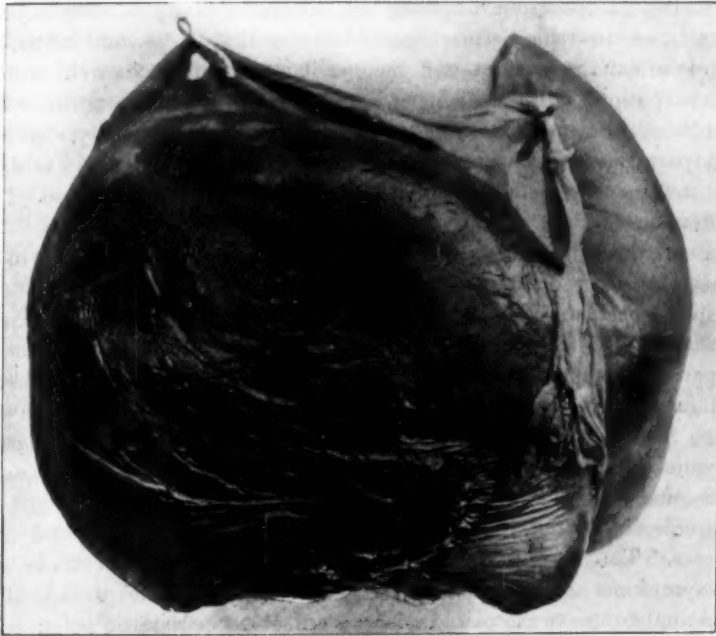
When first seen at the General Lying-in Hospital on November 16,

1913, the presentation was right occipito-anterior; there was slight œdema of the legs; the urine was neutral in reaction, contained no albumin, no acetone or diacetic acid. On November 24 (a week later) the patient was admitted in labour at term. The urine then contained a trace of albumin but no acetone or diacetic acid. Labour was natural and lasted seven hours fifty-five minutes, the patient was delivered of a poorly developed child weighing 5 lb. 7½ oz. Twenty-seven and a half hours after labour ended the patient vomited and became incoherent. Two hours later she had an eclamptic fit, then several in succession: she became comatose half an hour later, two hours after the onset of symptoms, with a pulse of 130 of full tension; temperature 99° F. Thirty ounces of urine were drawn off with the catheter and found to contain 0.2 per cent. of albumin; no acetone or diacetic acid. The treatment was by venesection to 15 oz., followed by the intravenous infusion of two pints of normal saline with the addition of ½ dr. sodium acetate to the pint. Morphia ½ gr. *sub cutem*, enemata and rectal wash-out, and lastly a hot-air bath, in which the patient perspired freely. Three hours later the patient suddenly collapsed, became livid and pulseless, and died in an hour and a half in spite of stimulation.

At the post-mortem examination, made fifteen hours later, the body was anæmic but well nourished. The peritoneal cavity contained 1 pint of fluid blood; round about the stomach and adjacent parts there was ½ pint of clotted blood, making 1½ pints of intraperitoneal blood in all. The liver was large, pale in colour, and covered with numerous subcapsular hæmorrhages of varying size. A large subcapsular hæmatoma occupied about half of the convex surface of the right lobe, reaching almost to its free edge. This hæmatoma formed an oval swelling under the capsule of the liver, raising it above the general surface about ½ in. The hæmatoma was 6 in. in diameter at its widest point and 4 in. in diameter at its narrowest point. Over nearly the whole of the hæmatoma the capsule of the liver had remained intact, but at its lowest and innermost point it had given way and blood had escaped into the peritoneal cavity to the amount of 1½ pints. Microscopically the liver showed numerous and extensive areas of hæmorrhagic necrosis of the cells at the periphery of the lobules. The kidneys showed no obvious naked-eye change. Dr. Trevor, Pathologist to the Hospital, reports: "The kidneys show an acute parenchymatous degeneration. The tubal epithelium, though fairly well preserved, stains badly. The blood-vessels do not contain thrombi

and there is no evidence of hyaline thrombi in the capillaries. The uterus and appendages were normal. The other abdominal and thoracic organs were apparently normal. The brain was not examined."

Reference to the occurrence of subcapsular hæmatomata which had burst through the liver capsule is to be found in a review by



Large subcapsular hæmatoma of the liver (after hardening).

Prutz (*Deutsche medizinische Wochenschrift*, 1897)<sup>1</sup> of the pathological findings in 500 cases of eclampsia. He describes the condition as occurring in four cases. Kaufmann, in his "*Spezielle pathologische Anatomie*" and Whitridge-Williams in his "*Text-book of Obstetrics*" also refer to this condition, the latter quoting a case described by Prutz, in which intraperitoneal bleeding was fatal.

<sup>1</sup> *Deutsch. med. Wochenschr.*, 1897, xxiii (Vereins-Beilage), p. 194.

**Intestinal Fistulæ made with a View to facilitating Recovery  
from certain Conditions which may follow Abdominal  
Operations.**

By JOHN D. MALCOLM, F.R.C.S.Ed.

AFTER an operation involving the peritoneal cavity conditions sometimes arise in which the surgeon believes that if he can induce the bowels to act the patient will recover, but that if the bowels will not act the patient will die, and yet an autopsy in such a case may show no obvious cause of obstruction. The symptoms are usually attributed to a paralysis or paresis of the intestine, and it is commonly said that the ineffective peristaltic action is caused by a septic infection of the peritoneum.

Septic infection may certainly cause paralysis and distension of the intestine followed by death, and symptoms resembling those of a complete occlusion of the bowel may constitute a conspicuous feature of the case. On the other hand, a temporary diminution of the activity of peristalsis follows every exposure and manipulation of the intestine, and discomfort from flatulence is often experienced during convalescence from abdominal operations. This discomfort, as a rule, passes off quickly and then no one attributes it to a septic peritonitis. But occasionally the condition develops until it presents all the signs of a complete obstruction, or an absolute paralysis of the bowel, and death follows. The evidence seems conclusive that in some of these cases the symptoms are due to an increased resistance to the passage of the intestinal contents associated with an enfeebled peristaltic action which is not due to a septic peritonitis. The condition may be described as one of acute intestinal stasis. Observations made when opium was considered a specific for the prevention of peritonitis support this view. The usual practice five-and-twenty or thirty years ago was to give 20 minims of tincture of opium by enema every six hours or oftener for a week, and to allow as little food by the mouth as possible so as to delay an action of the bowels until the eighth or ninth day after every operation upon the abdomen. As a rule gases passed the anus on the second or third day and the patient did well. But if no gases passed downwards after the operation, and if there was no other complication, the patient invariably died in the course of the fifth day, and

signs of a slight diffuse peritonitis spreading from the wounded parts were always found after death. This inflammation appeared to support the view that an obscure septic peritonitis was the cause of the symptoms and of death. But sometimes in these cases when the symptoms were well developed on the third or fourth day after the operation the abdomen was opened in the hope of finding an intestinal obstruction, and in a typical case no sign of peritonitis was then discovered. Again, when the symptoms were so advanced that recovery seemed beyond hope, it occasionally happened that gases escaped from the anus without apparent cause and the adverse symptoms disappeared. This sudden improvement in desperate circumstances may also be observed under modern treatment. The facts seem to prove that the symptoms were caused by a difficulty in the downward passage of the intestinal contents, and that if this was removed by displacement of a mass of fæces, by yielding of an adhesion, or by any other means, the patient recovered. The evidence is conclusive that in these cases a diffuse peritonitis developed as the patient was dying. The inflammation was therefore a consequence and not the cause of the mode of death.

This view is supported by the marked improvement in results which followed the substitution of rational feeding and a judicious use of purgatives for starvation and continuous opium treatment in cases of abdominal surgery. But modern methods have not altogether done away with intestinal difficulties in these cases and the following records show that occasionally a cure may be effected by making a fistula, this treatment being founded upon the belief that in some cases a delayed action of the lower bowel and not a septic peritonitis is the cause of intestinal distension. In five of the six cases in which recovery took place the fistula was successfully closed.

*Case I.*<sup>1</sup>—A multipara, aged 30, developed a large tuberculous pelvic abscess which was incised by another surgeon and fæces escaped freely. Two months later I reopened the abdomen with a view to short-circuiting the intestine, but at that time nothing was done except to examine the parts and drain a portion of the abscess, which extended through the left inguinal canal as high as the costal margin. After this operation the patient's condition was unsatisfactory from the first; gases and fæces passed into the abscess cavity from time to time, but never freely. Ten days later vomiting was frequent, the abdomen was distended, and neither sedatives nor stimulation of peristalsis

<sup>1</sup> Some details of this case have already been published. "Remarks on 400 Operations involving the Peritoneal Cavity," *Practitioner*, 1912, lxxxviii, pp. 395-397.

made any improvement. The temperature had not been above 99° F., the pulse was small and thready. The patient was steadily becoming weaker, and death from exhaustion was considered unavoidable unless some change could be effected. I therefore opened the abdomen low down on the right side and fixed a Paul's tube in the first presenting coil of small intestine. Many new peritoneal adhesions were observed, but there was no free fluid or other sign of inflammation. Much fæces escaped through the tube and all immediate danger was over next morning. Three days later fæces were passing the newly made fistula and entering the pelvic abscess. The abdomen was subsequently opened eight times in this case, and each operation was followed by a profuse discharge of fæces from the fistula made as above described. This continued three or four days and then the bulk of the intestinal contents again passed to the lower bowel. Two communications between the abscess and the alimentary tract were shut off by short-circuiting the small intestine and by a left colostomy, and a suppurating tube and ovary were removed, but all attempts to close the remaining fistula failed. The method adopted in Case III was not thought of at that time. Later on tuberculosis spread to the lungs and the patient died of a general infection eighteen months after her first operation.

In this case the septic state of the patient may have favoured the formation of peritoneal adhesions, but it is clear that the adhesions and not the sepsis caused the symptoms which were relieved by the fistula formation.

*Case II.*—A woman, aged 46, in the course of an operation for the removal of inflamed Fallopian tubes performed by another surgeon, sustained an accidental injury to her sigmoid flexure which was repaired and nothing further was done. I was asked to see the patient on the fifth day after the operation, when very little flatus had passed from the anus; the abdomen was immensely distended and vomiting was constant. The temperature had not been above 99.2° F., the pulse was 128, small and quickening. It was agreed in consultation that immediate relief was necessary and that no great degree of manipulation could be borne by the patient. I introduced a Paul's tube into the cæcum and next morning all danger was over. After a time the bowels acted naturally, and three months later the uterus, ovaries and Fallopian tubes were removed. Much fæces escaped from the fistula for three or four days after this operation also and then it gave little trouble. It was closed by operation four and a half months after it was made and the patient's health is now, two years later, completely restored.

In this case the distension was clearly not due to a paralysis of the small intestine, nor to an occlusion of the large intestine. A delayed passage of fæces through the latter was the cause of the symptoms. Periods of delayed action are natural to the large bowel and they



are prolonged after an excessive stimulation. In this case the large intestine only wanted a little time to recover from the effects of its injury and manipulation. The cause of the difficulty was not a septic peritonitis.

*Case III.*—After the removal of an almost universally adherent ovarian tumour which filled the pelvis much raw tissue was necessarily left exposed in the peritoneal cavity. On the fifth day after the operation little gas had passed the rectum and the symptoms were essentially the same as in the last case. An incision was made over the cæcum, which was collapsed, and a Paul's tube was fixed in the first presenting coil of small intestine. Numerous recent adhesions were observed and some serous fluid escaped from the peritoneal cavity, but no drainage except of the intestine was provided. There was immediate relief from the symptoms and after a few days the bowels moved naturally from time to time. A month after the first operation, on November 5, 1912,<sup>1</sup> the abdomen was again opened in the middle line, and without disturbing the fistula the intestine above it was divided and both ends were closed. A lateral anastomosis was then made between the upper part of the bowel near its closed end and a coil of intestine about 4 in. below the fistula. Numerous adhesions were observed. This operation was followed by a free escape of fæces from the fistula which continued about four days, and then nearly all the contents of the intestine passed by the natural way. Six weeks later the fistula was excised. It was still feared that the condition which necessitated the fistula formation might recur, and therefore the piece of bowel leading from the anastomosis to the artificial anus was inverted and drained by a rubber tube through the lower end of the incision in the abdominal wall. Again there was a copious flow of fæces from the fistula for a few days: when it ceased the tube was removed, the parts quickly healed, and the patient's health is now completely restored.

Here again there was no paralysis of the intestine above the fistula and no occlusion of the bowel lower down. The symptoms which threatened life were not due to a septic peritonitis but to a delayed passage of the intestinal contents through the lower adherent coils of small intestine and through the colon.

*Case IV.*—A single woman, aged 28, suffered from fever with obscure symptoms beginning with a sore throat, and after six weeks an abscess, situated behind the anterior abdominal wall at the level of the umbilicus, just outside the right rectus abdominis, was opened and drained. It contained about a drachm of pus and it was thought to be associated with a misplaced

<sup>1</sup> In the *Practitioner* of February, 1913, xc, pp. 455-460, Mr. E. Gillespie described a similar operation in a paper on "The Treatment of Gangrenous Hernia by the Combined Anastomosis and Fistula Operation."

appendix, but further investigation was not considered wise at that time. The temperature fell, the wound healed, and recovery seemed satisfactory, the patient getting about much as before. Abdominal pain without fever returned after five months. The patient was a big stout woman, and at no time was anything more definite made out than a slight fullness of the abdomen and a general resistance to palpation in the pelvis. After two months' rest, when the distension was less and the abdomen was softer, another operation was performed. There was only one small, soft adhesion where the abscess had been and this was released. Extensive old peritoneal adhesions were found in the pelvis and there were considerable collections of serum amongst these adhesions. The fluid was loosely held and its presence was not recognised until it was set free. The cæcum was fixed in the pelvis, and behind it in a cavity partly formed by its wall, partly by the pelvic peritoneum, there was a straight stercorolith (in two pieces), 1 in. long by  $\frac{1}{2}$  in. in diameter. No trace of the vermiform appendix was seen. It must have sloughed into the cæcum and the abnormal cavity almost certainly communicated with the bowel through some undiscovered sinus. The part of the cæcum forming the wall of the cavity containing the stercorolith was removed with the lowest coil of small intestine, which had no healthy peritoneum on it, and the divided cæcum and ileum were united. The part of the pelvic peritoneum that had been in contact with the stercorolith was scraped and carefully cleaned, and a drainage-tube was placed in the pelvis. A considerable area of raw tissue was necessarily left exposed to coils of intestine when the abdomen was closed. On the fifth day after the operation this patient had very much the same symptoms as those observed in the last two whose records are given above. But the distension was not so great and vomiting was not an urgent symptom, although much gas was thrown up from the stomach. There was also on the fourth night a low form of delirium, which, however, passed off on the fifth morning, when little or no gas had escaped downwards. The abdomen was then opened and many adhesions were observed. A Paul's tube was fixed in a coil of small intestine and from it some gases escaped, but no real relief followed, and the patient died a few hours later. There was no post-mortem examination.

In addition to the differences already mentioned between this case and those above recorded there was the area on the pelvic wall which had been in contact with the stercorolith and which possibly was not completely sterilised. The case may therefore have been one of septic peritonitis. On the other hand, it may be that an obstruction occurred from an adhesion high up in the small intestine, and that the fistula made was too low down. This would account for the small amount of distension and the failure of the treatment. The record shows how difficult it may be to distinguish clinically between abdominal distension due to septic peritonitis and that caused by interference with the downward passage of the intestinal contents.

Two cases may be mentioned here in which I assisted at operations involving a fistula formation for the relief of intestinal distension following a laparotomy. In one there was a septic peritonitis; in the other many adhesions were separated and temporary relief was given. Both patients died.

*Case V.*—A cancerous growth of the transverse colon and a piece of the stomach wall were removed. Three days later no gases had passed the anus, the abdomen was distended, and there was severe pain at the seat of the end-to-end colon anastomosis. It was feared that a persistent retention of gases or a rupture of the anastomosis might occur and a Paul's tube was inserted into the cæcum. Relief was immediate and complete, and sixteen days later an ileo-sigmoidostomy was performed, after which the fistula healed and the patient had no further trouble until secondary disease developed in the liver ten months later.

This patient would certainly have died after the first operation if gases had been retained persistently, and the case shows how promptly relief may be obtained in some cases by making a fistula. The symptoms were not caused by a septic peritonitis, but a septic peritonitis would have developed and spread from the line of the anastomosis if the patient had died.

*Case VI.*—In this case a small abscess at the bottom of Douglas's pouch, measuring about  $1\frac{1}{2}$  by  $\frac{3}{4}$  in., had a sloughy wall which seemed to consist of the distended thickened vermiform appendix and was so intimately adherent to the rectum that it could not be separated without tearing the bowel. The pus, which was very putrid, extended beyond the cavity of the appendix and was shut in by adherent intestine. The right Fallopian tube was also suppurating and it was removed. The base of the appendix was ligatured and cut short, but it could not be inverted because the tissues were so hard and so easily torn. A coil of small intestine was opened in separating part of the appendix from it, and this also could not be closed because of the friability of the tissues. The patient's condition necessitated a speedy termination of the operation and therefore a big opening was made into the vagina for drainage of the pelvis, and the perforated coil of small gut was fixed in the abdominal incision with a Paul's tube secured in the tear in its wall. The patient made a slow recovery. Six weeks later the bowel was closed by sutures and replaced in the abdomen, and the wound healed by first intention.

*Case VII.*—In removing a fibroid uterus with its cervix and an acutely inflamed abscess of the left ovary and Fallopian tube the rectum was accidentally torn. The rent,  $\frac{3}{4}$  in. long, was carefully closed and the peritoneum was arranged so that any escape of feces that might take place would pass into the vagina. The parts were so inflamed and sloughy that I fixed a Paul's

tube in the cæcum to diminish for a time the flow of fæces through the rectum. Gas bubbled freely from this tube within twelve hours of the operation, and although there was some escape of fæces into the vagina the parts healed firmly. Six weeks later the fistula in the cæcum was closed by operation, after which there was no more escape of fæces into the vagina, and convalescence was uninterrupted.

The cæcum was preferred to the sigmoid flexure as the site of the fistula in this case, because in that position it more certainly guaranteed an absence of intestinal distension. The early escape of gases from the cæcum again suggests the view which so much of the clinical evidence supports—namely, that a delayed action of the large intestine is one of the most important causes of trouble from retained fæces after abdominal operations.

In conclusion, I would emphasise the point that the formation of a fistula is a method to be avoided if possible, but these records show that the inaction of the bowels which sometimes proves fatal after an abdominal section may occasionally be overcome by making a fistula when there is no hope from any other treatment. This method was employed to prevent trouble in Cases VI and VII above recorded, and in the others to relieve conditions threatening death. To prevent trouble an anastomosis—that is, a fistulous opening into a lower part of the alimentary tract—is generally to be preferred to an external fistula formation, but in the last two cases recorded a temporary inaction of the rectum offered very decided advantages to the patients, and this inactivity below the sigmoid flexure can be obtained only by making a fistula.

In considering whether this method should be employed to relieve persistent abdominal distension after an operation upon the abdomen, the surgeon should carefully review all the circumstances of the first operation. If an infection has been unavoidably introduced from some foul abscess or from some mucous membrane, and septic peritonitis has been thus set up, the making of a fistula after two or three days is not likely to be useful. The success of a fistula formation in the circumstances under consideration depends mainly upon a selection of cases in which the symptoms are not due to a septic contamination. If the surgeon is confident that his efforts to prevent peritoneal infection have been successful, and especially if he knows that raw surfaces have been exposed uncovered by peritoneum in the abdominal cavity, the possibility that distension may be caused by adhesions to the bowel and that the patient may be saved by making a fistula should not be

forgotten. To be successful this treatment must be undertaken before the diffuse peritonitis which precedes death in these cases begins, or at least before it has spread far. But the surgeon has to decide first that the ordinary non-surgical forms of treatment are useless. If he can do this on or before the third day, if his patient is then in good condition, and if the circumstances of the first operation offer a hope of success, if, for instance, it is known that there are only one or two small areas where adhesions are likely to be found, the surgeon may then be justified in attempting to define and treat the cause of the symptoms, and he may have the very great satisfaction of releasing an adhesion and immediately curing his patient.

After the third day, if no gas has escaped from the anus, and if operative treatment is considered necessary, especially if it is known that many raw surfaces have been left uncovered by peritoneum, the surgeon should, as a rule, resist the temptation to define the conditions present, and should content himself with exposing a distended coil of small intestine as low in its course as possible, or the cæcum, and opening it quickly, doing nothing more unless it be to drain the peritoneal sac also. At this time, if no gases have escaped from the anus, the patient is very nearly moribund and extensive manipulations will almost certainly prove fatal. But if relief from distension can be given by making a fistula, the patient may live, and the cases recorded above show that if this relief and prolongation of life are obtained the surgeon has a good prospect of being able to close the fistula safely after a short time, and so a complete cure may be obtained.

If gases pass the anus after the operation but not freely, surgical interference may be delayed, and the bowels may gradually recover their tone. If the patient gains strength, and the partial obstruction continues, a more extensive operation may be undertaken later, but prolonged distension with vomiting may make the patient so weak that again only the smallest interference possible can be borne and any surgical treatment may be dangerous. The first case above recorded shows that even as late as the tenth day the formation of a fistula may save a life which is apparently beyond hope. The patient in that case could hardly have been in worse condition for surgical interference because of the large discharging abscess and of ten days' intestinal distension and almost complete starvation, and yet the fistula formation was entirely and immediately successful in preventing imminent death. In that case a consideration of the operation which caused the mischief made the thought of undertaking any extensive manipulations

impossible, and this consideration of the conditions which lead up to the intestinal distension is always of the utmost importance in deciding what to do in such cases and whether it is wise to attempt anything by surgery.

#### DISCUSSION.

Dr. TATE was much interested in the reports of Mr. Malcolm's cases and wished to congratulate him on the results of his surgical procedures. He had not come across any cases which, in his opinion, called for the rather serious line of treatment adopted by Mr. Malcolm. Occasionally, very great distension of the abdomen following severe abdominal operations caused great discomfort to the patients and serious anxiety for a time. In addition to relief by enemata and aperients, he had found marked benefits follow the hypodermic injection of eserine and pituitary extract. He wished to ask Mr. Malcolm whether he had made use of these valuable remedies in any of the cases which he had described before proceeding to carry out the surgical measures described in his paper.

Dr. BRIGGS said Mr. Malcolm's efforts had been more encouraging than his own, with only two cases in which the intestinal stasis was sufficiently localised for successful surgical drainage. An acute, general, firm distension, whether post-operative or not, in gynaecology, had become significantly less frequent; well-established cases rarely yielded to either medicine or surgery. Mr. Malcolm's results brought a welcome encouragement of a more prompt surgical attention to intestinal complications in gynaecology.

Dr. HUBERT ROBERTS was particularly interested in Mr. Malcolm's paper, as one, if not two, of the cases referred to had either been under Dr. Roberts's charge or he had met Mr. Malcolm in consultation over them. Dr. Roberts congratulated Mr. Malcolm on his results; it was evident that in certain classes of distension following abdominal section the formation of an intestinal fistula and drainage by Paul's tube was necessary. The question was largely one for diagnosis: Was the distension merely paresis, or was it due to mechanical causes or septic peritonitis? If mechanical, evidently the intestine should be opened above the obstruction; if due to peritonitis, in which intense abdominal pain on palpation seemed the chief diagnostic factor, opening the intestine seemed of little value. In mere paresis, although the distension might be alarming, there was very little pain on palpation, and he relied in such cases on getting the bowels opened within twenty-four hours, combined with turpentine enemata or turpentine rectal lavage. Dr. Roberts agreed with Dr. Walter Tate as to the value of pituitary extract and eserine sulphate in this condition. *Morphia* made things worse, and Dr. Roberts suggested that much of the discomfort could be relieved by



enemata of aspirin and bromides. Injections of strychnia for one or two days before performing abdominal section seemed to be of value in keeping up intestinal peristalsis afterwards.

Mrs. SCHARLIEB said that a case of paralysis of the intestines after operation had come under her care. The lady was the subject of a large fibroid growing from the right side of the uterus, opening up the right broad ligament, and encroaching on the pelvic brim. She became pregnant, and the question arose whether it was possible to deliver a viable child by means of induction, or whether the pregnancy should go to full term and be ended by Cæsarean section. The latter alternative was adopted. Labour came on naturally and the operation of Cæsarean section went well; the child, a healthy male, was extracted alive. Then the tumour was removed. The patient rallied from the operation and appeared to do well for several days. The bowels, however, did not act, although flatus passed fairly freely. After a time sickness supervened and the patient went downhill. In spite of various drugs by the mouth, enemata, and the injection of hormonal into the right median vein, no action could be procured, and finally the abdomen was opened to search for any possible cause for obstruction. None was found, and there was no peritonitis. Gentle massage of the colon, which was packed with fæces, caused peristaltic movements. However, the patient was *in extremis* and the operation was stopped. Subsequent careful examination showed no apparent cause for the stasis. In all probability, had this case been treated by the formation of a fæcal fistula the patient would have recovered.

Mr. MALCOLM said, in reply to Dr. Tate, that he had much experience of all kinds of difficulties and means for overcoming difficulties from inactivity of the bowels after abdominal operations. The results were often satisfactory, and they had greatly improved; but, especially in the earlier days, the patients did not always get well, and in one of the cases recorded in his paper, in which the operation was performed on October 31, 1912, the patient died. He knew that such fatal experiences had been met with by other surgeons even recently. As regards the action of eserine and pituitary extract, he agreed with those who did not place a supreme faith in these drugs. His experience was, perhaps, unfortunate, but in cases of real difficulty he had come to think of them as unreliable. At one time he followed strictly the rule of allowing no opiate to be given to any of his patients after an operation upon the abdomen under any circumstances whatever. But this was so contrary to the almost universal practice that he thought it might be a mistake founded probably upon the evil results he had known to arise when opium was administered in full doses for many days after every operation upon the abdomen, as was the practice of some surgeons when he joined the staff of the Samaritan Free Hospital. He had, therefore, relaxed the rigour of his rule against giving opium; and to this change he had been led more especially since he was treated by a dose of morphia after an operation upon himself. He gave opium when pain was

severe, and when a patient was very restless after an operation; but he still believed that this drug should be used with caution. The case mentioned by Mrs. Scharlieb bore very directly upon the argument he had put forward. It reminded him of a post-mortem examination he made many years ago. A patient died with typical symptoms of the condition he had described, and 3 or 4 in. of descending colon were narrowed, and tightly packed with hard fæces. Under the opium treatment practised at that time by the surgeon who operated, these fæces formed a complete obstruction. In such a case, and more particularly in Mrs. Scharlieb's case, in which much of the colon was affected, time was necessary to relieve the condition, and sufficient time was not available. The condition could usually be avoided, but in Mrs. Scharlieb's case, and in any patient who had a large mass in the abdomen, it might be difficult to clear the lower bowel before the operation. As Mrs. Scharlieb suggested, she would almost certainly have saved her patient by making a temporary cæcal fistula. Cases in which benefit would result from this treatment were rare, but the cases now recorded showed that they did occur, and the speaker was much indebted to Mrs. Scharlieb for bringing forward a case which so strongly supported the views he had expressed. He was convinced that occasionally a life might be saved by the making of an intestinal fistula which would otherwise be lost from inaction of the intestine after an abdominal operation; but he was particularly anxious that it should not be thought that he advocated a frequent or hasty resort to this method of treatment.

## Obstetrical and Gynæcological Section.

December 3, 1914.

Dr. W. S. A. GRIFFITH, President of the Section, in the Chair.

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### Tuberculous Infection of a Tubo-ovarian Mass.

By CLIFFORD WHITE, F.R.C.S.

THE specimen is an example of tuberculous infection of a tubo-ovarian mass. It was removed from a patient, aged 26, who was admitted to St. Mary's Hospital for Women, Plaistow, on September 5, 1914, under my care. She complained of pain in the right side, which had been present since November, 1913, and followed an attack that was said to be appendicitis. This attack consisted of vomiting and pain in the right side which kept her in bed for six weeks. She had never been pregnant, her menstrual periods usually lasted only two days, but there had been complete amenorrhœa for three months before admission into hospital. Slight dysmenorrhœa had been present since the appendicitis. No increased leucorrhœa had been noticed, but the patient complained of occasional dysuria and nocturnal frequency of micturition. She had noticed recently that she sweated freely at night, but there was no cough. In July, 1914, during an attack of sickness, about half a teaspoonful of blood was vomited, but there had never been any hæmoptysis. No family history of tuberculosis.

The patient was found to have a mass in the right iliac fossa which was regular in outline, dull on percussion, immovable, and not very tender. It extended down into the pouch of Douglas, and displaced the uterus somewhat to the left. The left tube was also palpable. The mass on the right was about 6 in. across. The temperature was not hectic. No signs of tuberculosis were discovered in the lungs or elsewhere.

At the operation on September 8 the omentum was found firmly adherent in the pelvis, the adhesions were very dense, and with some difficulty access was obtained to a cyst which was intimately connected with the right broad ligament. The cæcum was adherent to the front and right aspect, and a long, thickened, infantile appendix ran across the top to terminate in the left iliac fossa, where it was adherent to the tumour. The appendix was excised and the tumour was then raised and removed. The left tube, which formed a hydrosalpinx, was also removed. The uterus and left ovary appeared to be healthy and were not removed. No miliary tubercles were noticed on the peritoneum and there was no ascites.

The patient recovered, and six weeks after the operation there was no mass palpable in the pouch of Douglas.

The tumour is regular in outline and measures 14 cm. by 11 cm. by 9 cm. Its wall is  $1\frac{1}{2}$  cm. in thickness. No tubercles are to be seen on the surface, but adhesions are present. The interior of the mass is divided into half a dozen loculi by definite fibrous trabeculae. The loculi are lined by thick, tenacious yellow pus. The suppuration has reached the surface of the tumour in two places. On section the walls of the cavities were found to be composed of fibrous tissue. No epithelium is present as a lining to any of the loculi. Typical tuberculous giant cells are present in very large numbers, in some places these are surrounded by round-celled infiltration or necrosis, but in others they occur in fairly healthy tissue. The tubercles are present in both the superficial and deeper portions of the tumour. No muscle tissue is present, and so the tumour does not appear to be a pyosalpinx. I regard it as an example of a tuberculous infection of an ovarian cyst and not a caseous ovary, because of (a) the presence of definite fibrous septa dividing the tumour into loculi such as are seen in cyst-adenomata; (b) its exceptionally large size; (c) the fact that the opposite ovary was macroscopically normal.

*Report of the Pathology Committee.*—"The tumour is probably a tubo-ovarian mass containing caseating granulomatous areas, some of which have broken down in the centre. Many of these areas are separated by distinct fibrous septa. The destruction of tissue is so great that no epithelial elements, either solid or cystic, can be found, and it is therefore impossible to demonstrate that the specimen represents an ovarian cyst."

**Interstitial Tuberculous Salpingitis.**

By CLIFFORD WHITE, F.R.C.S.

THIS specimen shows the unusual form of tubal tuberculosis in which lesions are found in the substance of the wall of the tube, although in the same section the exterior and mucosa of the tube are quite healthy. The specimen was removed in April, 1912, by Mr. Corrie Keep (who kindly gave me the specimen for investigation) from a woman, aged 28, who had had pain in the back for two years and amenorrhœa for eleven months. Previously her periods had occurred every five weeks and lasted two days. Dysmenorrhœa of some severity was present. No obvious tuberculous foci were present in lungs or elsewhere. On examination bilateral salpingitis was present. The temperature was normal. The left tube and also the right tube and ovary were removed. No peritoneal tubercles were noticed during the operation. The patient did well.

The left tube is enlarged at both ends so that the fimbriated extremity measures 2 cm. in diameter and the uterine end 3 cm. by 2.5 cm. No tubercles are seen on the surface of the tube. On section of the *left* tube, near the uterine end the swelling is caused by a breaking down mass in the wall of the tube. Microscopic examination shows that the exterior of the tube is healthy and the plicæ lining the interior are quite normal. The necrotic tissue contains giant cells. Tubercle bacilli were demonstrated in this tissue by Mr. H. G. Butterfield. The mass at the fimbriated end is formed by proliferation of the tubal mucosa. Numerous giant cell systems are present in and between the plicæ (endo-salpingitis). The *right* tube is dilated and forms a hydrosalpinx. The plicæ are stretched out by pressure, but the epithelium is healthy and shows no signs of tuberculosis. There is slight adenomyo-salpingitis present. In the wall a few giant cells are present. These are also seen in a section of the uterine end where the lumen of the tube is not dilated and no endo-salpingitis is present.

### Multiple Myoma.

By H. MACNAUGHTON-JONES, M.D.

DR. MACNAUGHTON-JONES demonstrated a myomatous uterus containing large numbers of intramural and submucous growths. The specimen was removed from a patient, aged 47. The tumour weighed 1 lb. 1 oz. The nuclei varied in size from that of a small egg to a pea. There were three larger intra-uterine growths, two in the fundal cavity and a cervical polypus. Altogether, in this comparatively small-sized tumour there were over thirty growths, subserous, in the cavity and in the wall. The uterine surface was studded over with them, and its wall was a mass of nuclei. It was noteworthy that the patient sought advice for symptoms other than pelvic ones. Only for the past year had she suffered from menorrhagia. Multiple tumours were very common, but he had never seen one quite like this.

They would see on the screen a giant myoma that some years back he had removed from a patient approaching her sixtieth year. In this there were some hundred small growths; and curiously enough, he removed some years afterwards from her daughter a multiple myoma, which he also showed. This was one mass of nuclei.

### Cancer of the Cervix with Pyometra.

By C. HUBERT ROBERTS, M.D.

G. W., AGED 62, married, seven children, two miscarriages, was admitted to the Samaritan Free Hospital on October 10, 1914. Climacteric seventeen years ago. History of severe hæmorrhage three months before admission. Hæmorrhage since, with gushes of putrid fluid accompanied by severe colicky pains.

On examination I found a very curious cervix, very hard; no real growth made out, no ulceration or bleeding. The uterine body markedly enlarged, very soft, and quite mobile. There was no involvement of the pelvic parametric tissues.

The case was seen by Mr. Malcolm and Dr. Lockyer. We concluded it to be one of pyometra, probably complicating cancer of cervix uteri.



On October 20 the patient was carefully examined under an anæsthetic. There was no foul discharge nor bleeding, nor could I be certain that the cervix was malignant. There was no growth on the vaginal walls.

On October 31 the patient suddenly passed nearly a pint of putrid material; it was so foul that the whole ward was contaminated by the smell. Next day, with the assistance of Dr. Lockyer, I removed the uterus by a modified Wertheim's operation. The case was a difficult one owing to very fat abdominal walls and difficulty in holding the almost cystic uterus, which evidently contained fluid. At the end of the operation the vagina ruptured and a quantity of foul material escaped into the deep parts of the pelvis.

The case progressed favourably for some days, when some very foul discharge was passed *per vaginam*, and the lower part of the abdominal wound was evidently infected. Subsequently the case did well, and now all pains and discharge have ceased.

After hardening, the specimen shows a tubular growth of the whole cervix apparently blocking the canal. The growth extends from the vaginal portio as far as the os internum and is densely hard. Above this is seen the much dilated uterine cavity filled with purulent débris and granulation tissue. It has the characters of a squamous-celled carcinoma on microscopic section. It is evident that the growth gave rise to the pyometra which, from time to time, emptied itself into the vagina. It is somewhat curious that the cervix did not seem clinically malignant even when examined under an anæsthetic. In old women with intermittent gushes of blood and foul discharge I think this condition should always be suspected.

#### DISCUSSION.

Dr. TATE had reported three cases of pyometra associated with advanced carcinoma of the cervix in vol. xxxix of the *Transactions of the Obstetrical Society of London*. The three cases occurred in patients aged 61, 62, and 65.

complication of carcinoma of the cervix never occurred during the period of menstrual activity. Although the pus in these cases was always highly offensive, there was, as a rule, no rise of temperature, and in only a small proportion of the cases was there any pain. The speaker had recently operated on a case of pyometra secondary to senile endometritis in a patient, aged 72, which was complicated with suppuration, salpingitis and abscess in the right ovary. Out of a large number of cases of pyometra that he had seen, this was the only case in which there was any spread of the infection along the Fallopian tubes. The cervical canal in the patient was quite patulous.

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Dr. AMAND ROUTH said he recalled that one of Dr. Tate's specimens to which he had referred and one of his own were those of pyometra with no occlusion of the cervix, which in both cases was the seat of carcinoma. It was therefore not necessary for pyometra to be associated with an organic stenosis of cervix.

Dr. BLACKER thought that the case described by Dr. Roberts furnished an argument in favour of the method he adopted of curetting and cauterising the growth some days before performing a Wertheim's operation. This enabled a pyometra to be recognised and evacuated, and obviated the danger of its rupture during the course of the operation. It also, in his opinion, lessened the risk of sepsis and enabled the operation to be undertaken with greater safety. If the cauterisation was carried out thoroughly he thought the risk of the dissemination of cancer cells a very small one.

Dr. ROBERTS, in reply, said that he had not shown the specimen in order to raise any discussion as to the preparation of the patient previous to operation, or as to the question of operation, or what operation. Operation was evidently necessary, but this case was one in which the diagnosis was difficult, as no malignant disease of the cervix was discoverable by vaginal examination; it was only suspected. Given a case of profuse intermittent purulent discharge from an old woman with an enlarged uterus, Dr. Roberts contended that pyometra with cancer was to be suspected.

### Two Cases of Hysterectomy for Ante-partum Hæmorrhage.

By T. G. STEVENS, M.D., F.R.C.S.

#### (I) CASE OF PLACENTA PRÆVIA CENTRALIS.

E. P., AGED 37, eleven children, was admitted to Queen Charlotte's Hospital on July 5, at 1 a.m., with the history that she had had a severe blood-loss that evening. She was about twenty-eight weeks advanced in her twelfth pregnancy. On examination it was found that the os uteri admitted two fingers, and placental tissue was found all over the lower segment of the uterus. At 2.50 a.m., under an anæsthetic, the os uteri admitted two fingers, and a Champetier de Ribes's bag was introduced through the placenta. During this procedure a large loss of blood occurred, estimated at over 2 pints. A weight of 1 lb. was attached to the dilating bag. At 5 a.m. the patient became collapsed for no reason which could be discovered—there had been no more bleeding. Morphia  $\frac{1}{4}$  gr. was given, and a subcutaneous infusion of 2 pints of saline. The patient then fell

asleep and the general condition improved. There were no uterine contractions. At 9 a.m. the bag was expelled and the uterus was found to be in a state of tonic contraction. The pulse, which had been 140, fell to 120 and the general condition was better. Mr. Stevens saw the patient at 10 a.m., and advised leaving her alone as long as there was no further bleeding. 7.30 p.m.: The tonic contraction of the uterus began to pass off, and the uterus relaxed. Pulse still about 120.

As the child was dead, the cervix not dilated, and no bleeding was taking place, Mr. Stevens decided to perform a panhysterectomy without disturbing the contents of the uterus. This was done at 9.30 p.m., under morphia and atropine, urea-quinine hydrochloride skin infiltration, and the smallest amount of open ether which would ensure unconsciousness. Saline was infused during the operation, 2 pints under each breast. The operation was particularly easy to perform, the incision being made just at the junction of the cervix and vagina. Not more than 3 oz. of blood was lost, and at the end of the operation the patient was in good condition with a pulse of 132.

The patient made an uninterrupted recovery.

## (II) CASE OF CONCEALED AND EXTERNAL ACCIDENTAL HÆMORRHAGE.

S. S., aged 33, eight children, was admitted to Queen Charlotte's Hospital on July 20, at 4 a.m., with a history of severe flooding at 10 p.m. the night before. On examination she was found to be about thirty weeks pregnant, the internal os was closed, the vertex was presenting, and the foetal heart was heard. No placenta could be felt, but the posterior fornix high up on the left side suggested the boggy feeling of a low implantation of the placenta. The pulse was 112 to 120. The patient looked pale, but there was no bleeding externally. Under these circumstances nothing was done and the patient was kept very quiet. At 4 p.m., twelve hours after admission, bleeding began again, and on the advice of Mr. Stevens an attempt was made to introduce a de Ribes's bag after rupturing the membranes. This failed owing to the rigidity of the internal os, so pituitary extract  $\frac{1}{2}$  c.c. was given and a tight binder was applied. At 5.30 p.m. more bleeding occurred and the pulse rose to 150. Morphia  $\frac{1}{4}$  gr. and 4 pints of saline were given subcutaneously. The bleeding ceased and the patient remained quiet until 11 p.m. when she became restless; the pulse was now 160 but of better volume. There were no obvious contractions of the uterus, and the os uteri remained undilated. The

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uterus now felt uniformly hard and the child could not be palpated. The diagnosis of concealed accidental hæmorrhage was suggested, and Mr. Stevens determined to perform hysterectomy without disturbing the uterine contents. This was done under morphia and atropine, with novocain and urea-quinine hydrochloride infiltration of the abdominal wall, and a very small amount of open ether anæsthesia. Two and a half pints of saline were infused under the breasts during the operation.

The patient stood the operation very well, which was a very easy one, and at the end the pulse had fallen to 134. Except for some trouble with the healing of the abdominal wound, the patient made an uninterrupted recovery.

The uterus and contents were hardened whole in formalin, and on being opened showed that the tentative diagnosis was correct. The uterus was full of blood, and although the placenta had a rather low insertion it could not be called a placenta prævia. There was no evidence of hæmorrhage into the uterine wall.

*Remarks.*—These two cases illustrate an important point which arises in all severe cases of *ante-partum* hæmorrhage—namely, the bleeding having stopped spontaneously, or, as a result of treatment, what is the safest way to deliver the patient without further serious blood-loss? In general, it is universally agreed that delivery *per vias naturales*, by the natural powers, version, or forceps, is to be expected when bleeding has been controlled, and has been moderate in amount. Further, it should be an axiom that such methods of delivery should never be hurried, but, as long as there is no bleeding, as long a time as possible should be given to the patient to recover from the previous blood-loss before emptying the uterus. At the best, however, it must be admitted that the risk is considerable, because it is impossible, in all such cases, to guarantee that there will *not* be a *post-partum* hæmorrhage sufficient to kill the patient. With pituitary extract and subcutaneous saline infusion this risk can be reduced to a minimum, but it cannot be abolished. The two cases which have been cited represent examples of the two worst types of *ante-partum* hæmorrhage—namely, central placenta prævia and concealed accidental hæmorrhage. Further, in each case the amount of blood lost had been great—how great was not known because the initial blood-loss was not seen. The condition of the two patients, however, as shown by the rapidity of the pulse, the anæmia, restlessness, &c., was desperate, and neither could be looked

upon in the same light as cases in which the bleeding had only been moderate. The first case could have been delivered *per vias naturales*, as the head was presenting and the os was sufficiently dilated; but it was agreed that if another pint of blood was lost the patient would certainly die. The second case could not have been delivered without much manipulation, because the internal os only admitted a finger with difficulty. Also any attempt at examination at once led to further loss; if the attempt had been made, it was felt that death would have occurred before delivery could be effected. Cæsarean section was considered, but it was felt that there was no guarantee in either case that the operation could have been done without a considerable further loss. It is clear that the amount of bleeding in a Cæsarean operation varies very much, and although we can control it we cannot prevent it altogether; and it is not uncommon for a pint of blood to be lost in spite of every precaution. Reasoning along these lines, Mr. Stevens came to the conclusion that the only way by which delivery could be effected with the loss of the minimum amount of blood was by performing a panhysterectomy without interfering with the uterine contents. If this could be done without shock, it seemed to offer the best solution of the problem. The method of anæsthesia used combined with rapid operating proved that the operation in each case was practically shockless. The amount of blood lost did not amount to 3 oz. in either case. The operation in each case was an extremely easy one, and took less than half an hour.

*Conclusions.*—It is not intended that the older methods of treatment of *ante-partum* hæmorrhage are to be superseded, for every case must be treated on its merits. It must be contended, however, in the light of these two very serious cases—which it is fair to call desperate—that total hysterectomy carried out by a shockless method of operating offers a means of treatment with a prospect of a good result which could not be expected, or even hoped for, by any other method at present in use.

#### DISCUSSION.

Dr. BLACKER wished to congratulate Mr. Stevens on the successful result of his two cases. In that of concealed accidental hæmorrhage he quite agreed with the treatment adopted. On the other hand, the treatment of the case of placenta prævia was open to criticism, and was a good illustration of the dangers attending the use of a Champetier de Ribes's bag in certain cases. The more he saw of the use of this bag in these cases, the more he was convinced of the danger of severe hæmorrhage occurring after the birth of the

### 36 Roberts & Smeed: *Placenta Prævia with Unusual Sequelæ*

bag and before the birth of the child; and this was especially the case when care was not taken to see that the presenting part immediately followed the bag in its passage down through the pelvis. This was by no means easy, and in some malpresentations impossible. No such danger existed when podalic version was performed, and he thought that in this case if podalic version had been performed in the early stages the necessity for any abdominal section would never have arisen. A Champetier de Ribes's bag should never be used when the child was dead if it was possible to perform podalic version.

Dr. WILLEY said that in the case of the central placenta prævia she would have thought it possible to ensure the mother's safety and to deliver the child by bringing down a leg, if need be, through the placenta.

Dr. HERBERT SPENCER agreed with Dr. Blacker's criticism of the treatment of the cases of central placenta prævia. A Champetier de Ribes's bag was contra-indicated in such a case, the life of the child being almost inevitably lost. Version could have been done in a few seconds, and with practically no loss of blood. Natural delivery would have followed within three hours, and *post-partum* hæmorrhage would have been guarded against by pituitrin and, if necessary, packing. Dr. Spencer did not approve of the hysterectomy in the case of accidental hæmorrhage. He had recently had a similar case, and had sewn up the uterus after Cæsarean section. He thought the uterus was often unnecessarily sacrificed in these cases.

### Placenta Prævia with Unusual Sequelæ.

By C. HUBERT ROBERTS, M.D., and EDWARD SMEED, M.D.

WE venture to bring this case before the notice of the Section as one of rare occurrence, hoping that it may be of interest owing to the very unusual complications following delivery in a case of placenta prævia. The chief points are that a seemingly normal delivery was followed by septic infection and that the result was fatal from complications such as cerebral abscess, hemiplegia, thrombosis of the inferior vena cava and of the superior mesenteric vessels.

[In reporting this case Dr. Roberts said he was deeply indebted to Dr. Edward Smeed, his former Resident Medical Officer, for detailed clinical notes, and to Dr. Gilliatt for the careful post-mortem report.]

L. A., aged 28, was admitted to Queen Charlotte's Hospital on May 17, 1914, pregnant for the second time, at the thirty-eighth week,



suffering from severe hæmorrhage with placenta prævia. She had a bad loss a month before, and another just before admission. Her condition was bad, with grave pallor, an irregular rapid pulse, and weak pains. The child was alive, presenting by the vertex, the os dilated, membranes ruptured, and placental tissue clearly felt. A firm binder was applied and 1 c.c. of pituitrin given hypodermically. Half an hour later the child was expelled spontaneously. It weighed 6 lb. and was alive. Thirty minutes after the delivery of the child *post-partum* hæmorrhage set in. The placenta was partially adherent and had to be removed manually. The patient lost nearly 30 oz. of blood. At the time it was thought that portions of the membranes might be retained, but the patient's condition was so grave that no further manipulations were deemed advisable. Rectal salines and pituitrin were given to counteract the shock. For three days the patient's condition gave rise to no anxiety, but on the fourth day the temperature rose to 102° F., pulse 132, and offensive blood-clots were passed. Next day the temperature was 105° F., and pulse-rate 160. The uterus was explored and two large pieces of offensive placental tissue removed. The whole uterine cavity was very rough. Cultures were taken, and the uterine cavity douched with lysol. Two severe rigors followed, but later the condition of the patient improved. Cultures from the uterus yielded *Staphylococcus albus* and *Bacillus coli communis*.

On the ninth day after confinement the patient still seemed to have improved. Temperature 100° F., pulse 112; but there was a tender mass felt to the right of the uterus, most probably parametric. This increased in size during the next few days and there was more general abdominal tenderness and pain. These symptoms became more grave, and on the eighteenth day the patient had all the signs of general peritonitis accompanied by vomiting, distension, restlessness, and hiccough. Temperature 99° F., and pulse 138. For four days she seemed very ill but gradually improved. The abdominal distension became less and a definite parametric mass (? pus) was palpable on the right of the fundus and on the right iliac fossa (white leucocyte count 28,000 per cubic millimetre.)

On the thirty-first day symptoms of thrombosis of the left leg set in, with considerable pain and œdema, and next day the femoral vein could be felt as a thickened cord. Five days later the right leg was similarly affected, but with less œdema than on the left side.

On the thirty-eighth day the patient complained of curious sensations in the right hand and arm, with inability to move her tongue freely.

The temperature and pulse were normal and she did not feel ill. Next day the patient developed a complete right-sided hemiplegia with aphasia, with complete paralysis of the sphincters, and within the next twenty-four hours the whole of the right arm became œdematous as far as the clavicle. The axillary vein, however, could not be felt.

These symptoms somewhat abated during the following week and on the fiftieth day after delivery her condition had markedly improved. Speech to some extent had returned, also sensation in the arm and both legs. She could control the sphincters and slept and took food well. There was still a mass in the right iliac fossa, but the temperature and pulse were normal.

On July 9 (the fifty-fourth day) she seemed better again, the œdema of the legs having quite gone and only slight paresis of the right side of the face being noted.

On the sixtieth day signs of abdominal distension made their appearance, accompanied with distension and fæcal vomiting. Dr. Drysdale, our Consulting Physician, then saw the case, and advised colotomy should the symptoms of obstruction become worse. During the next few days she rallied somewhat, flatus being passed and the distension less, but it was evident that she was very seriously ill.

On July 18, sixty-three days after delivery, the patient became suddenly much worse, with marked distension and pain, the face became pinched and the pulse feeble and irregular. It was decided to perform colotomy and she was removed to the operating theatre, but on the table it was evident she was dying and that any operation was out of the question. She rapidly became unconscious and died the same day. The child lived and made good progress.

*Post-mortem Notes, by Dr. Gilliatt.*—The only abnormal external appearance is the great distension of the abdomen. On opening the abdominal cavity it was found that the omentum was adherent to the uterus, broad ligaments and pelvic colon, enclosing a fair-sized perimetric abscess. The small intestine was shut off completely behind the soft, thickened and adherent omentum. The abscess cavity contained a large amount of brownish fluid which had a strong fæcal odour. The small intestine in its upper part was greatly distended and the coils were adherent to one another; about half-way along the small intestine a piece of gut about 8 in. long was found, soft and collapsed, having very thin necrotic walls. In the centre of this length of small intestine was a large perforation. The vessels of the mesentery supplying this particular collapsed area were all completely

thrombosed. The uterus was of normal size and appearance, but very pale. The ovaries and tubes were matted on the wall of the pelvic abscess. Kidneys: Left normal; right congested, the pelvis being inflamed, roughened, and containing pus. The inferior vena cava was thrombosed along its whole length with soft yellowish clot which began at the internal iliac vein and extended up to the liver. The right renal vein was also collapsed. The other abdominal organs were normal. Thorax: There was considerable adherence of visceral and parietal pleura, especially on the right side, where the lung was somewhat collapsed; lungs elsewhere normal. Heart normal; no thickening of thrombi or valves. Skull normal. Brain: An abscess about the size of a hen's egg was present on the left side just below the cortex of the convolution behind the ascending parietal lobe. It reached almost to the surface in the great longitudinal fissure.

*Summary.*—We think the occurrence of such rare lesions are worth reporting, as we have not personally met with similar sequelæ of sepsis following placenta prævia. Cerebral abscess is uncommon enough, and complete plugging of the inferior vena cava is of very unusual occurrence. The thrombosis of a large area of the superior vessels, and the collapse and necrosis of the corresponding piece of small intestine, doubtless led to the symptoms simulating obstruction, for the relief of which colotomy would have been quite useless.

#### DISCUSSION.

Dr. W. J. MIDELTON asked Dr. C. H. Roberts whether he considered both the *Staphylococcus albus* and the *Bacillus coli communis* pathogenic in his case. Some years ago Dr. Dudgeon had shown that peritonitis was due in many instances to the pneumococcus, and there was often present at the same time the *Staphylococcus albus*. The cases in which this combination occurred always did better than those in which pneumococci alone were present. Dr. Midelton believed the *Staphylococcus albus* to be a protective organism.

Dr. ROBERTS briefly replied.

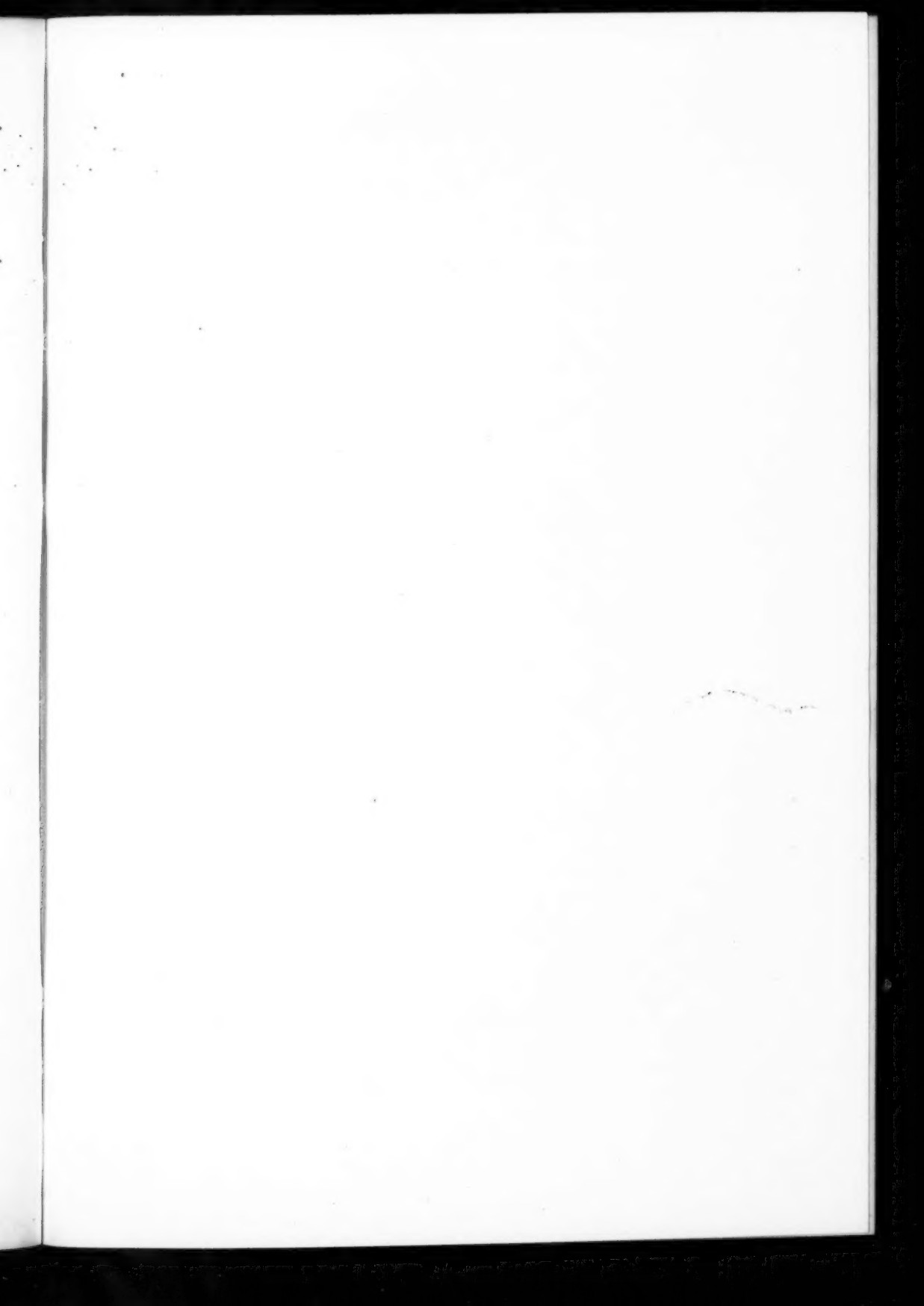
**Extensive Cancer of the Cervix, with Pyosalpinx; Patient  
well Seven Years after Wertheim's Hysterectomy.**

By HERBERT R. SPENCER, M.D.

M. K., AGED 28, was admitted into University College Hospital, on February 9, 1907, complaining of dull aching pain in the left side and in the sacral region, which had been present for three months, and of a continuous offensive brown discharge, occasionally containing blood, during the last two months; micturition was also frequent and painful. Menstruation began at the age of 14, was always quite regular, lasting four to six days, twelve diapers being used. The patient was married, but had never been pregnant. When she was aged 21 she had an attack of jaundice, and suffered from gastric ulcer five years ago.

The patient stated that she had been employed as a scrubber in a general hospital in London, and had consulted the obstetric physician, who, after examining her, advised her to go into the cancer ward of the institution, as no operation could be done. To get another opinion she applied at University College Hospital.

On admission the patient was found to be fat, but fairly well nourished, the pulse 76, temperature 99.7° F. The cervix was occupied by a large ulcerated growth as big as a small apple, which distended the vagina. The uterus was fixed by thickening in the left broad ligament and left utero-sacral ligament; the thickening was not nodular. The body of the uterus was difficult to examine owing to the size and fixation of the cervix; it did not appear to be enlarged. There was some mobility of the right side of the uterus. The patient was eager to have any operation done which gave her a chance of recovery. It was clear from the extensive infiltration in the left ligaments and from the large size of the cervix that it would be impossible to make sure of getting beyond the growth by vaginal operation. I decided to perform the extended abdominal operation. This was done under ether anaesthesia on February 16, 1907. The cervical growth was first curetted and cauterised, and several protruding masses were cut off with scissors; a solution of formalin (10 per cent.) was then applied. In performing the operation some difficulty was experienced owing to the presence of bilateral pus tubes, which were adherent to the pelvis and rectum, and especially in separating the left ureter and base of the bladder, owing to the inflammation of the cellular tissue around them.



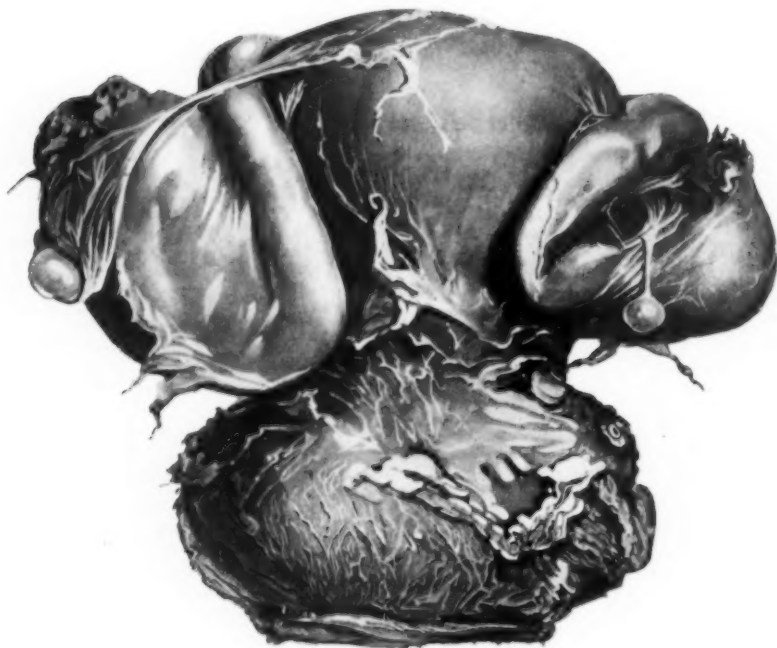


FIG. 1.

Specimen seen from behind (five-sixths natural size), showing cervix enclosed in vaginal cuff, bilateral pyosalpinx, cystic ovaries, and adhesions.



FIG. 2.

Specimen seen from below (five-sixths natural size), showing cervix surrounded by vaginal cuff, cystic ovaries, and adhesions.

*SPENCER: Extensive Cancer of the Cervix with Pyosalpinx; patient well Seven Years after Wertheim's Hysterectomy.*



In separating the bladder a hole was made into it and was closed with silk. About  $1\frac{1}{2}$  in. of the vagina were separated and clamped with Wertheim's forceps. The pelvic peritoneum was closed with fine silk except for a small space which admitted an abdominal drainage-tube; a T-shaped tube was also passed into the vagina. Salt solution was passed into the abdomen and the abdominal wound was closed with through stitches of silkworm-gut. An iodoform gauze dressing was applied and a catheter was tied in the bladder. No glands were removed.

The patient suffered somewhat from shock after the operation, but her condition improved after 35 oz. of saline fluid had been infused. The recovery of the patient was fairly good, but urine escaped from the abdominal tube for a few days and afterwards by the vagina, so the catheter was not dispensed with until March 14, when it was left out as the patient was dry. She got up on March 18, and left the hospital on March 20, quite well, except that there was occasionally a little involuntary escape of urine *per vaginam*. It was intended to inject the bladder with milk to see if there was a minute vesico-vaginal fistula which could not be seen through the speculum, but the patient left for Canada, where the fistula was found and closed by Dr. Marlow, of Toronto.

I examined the patient every year for four years after the operation and she has remained well and free from recurrence. In a letter from Canada, dated March 20, 1914, more than seven years after the operation, she says she is in the best of health and has no trouble of any kind.

The two drawings by Mr. Shiells were carefully made of the natural size of the specimen, but considerable masses had been removed from the cervix by knife and cauterization before the operation. The drawings have been reduced by one-sixth in reproduction.

The uterus was 10.3 cm. long, 4.7 cm. in thickness and 7 cm. wide. The cervix and cellular tissue in the hardened specimen before opening measured 8.5 cm. in width and 6.5 cm. in thickness. A cuff of the vagina measuring from 2 to 3.5 cm. in length has been removed. The cervix is enormously enlarged; antero-posteriorly on mesial section it measures 5.5 cm. An extensive nodular and excavated growth involves the whole cervix and has an overhanging edge not invading the fornix on the section, though it distends the lateral fornices. A considerable amount of cellular tissue was removed around the uterus and the specimen is covered with shaggy adhesions. There is a

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pyosalpinx in each side and the ovaries are enlarged with cysts containing blood.

Microscopically the growth is a squamous-celled carcinoma with a good deal of round-celled infiltration.

*Remarks.*—This case shows the advantage of the extended abdominal hysterectomy over vaginal hysterectomy in cases of cancer of the cervix in which the growth is no longer in an early stage. I have never made slight fixation of the cervix a bar to vaginal hysterectomy, knowing that the fixation is often due to inflammation and not to new growth. I have known such a case, which had been condemned by two eminent gynaecologists as unsuitable for operation on account of such fixation, remain well for six years after vaginal hysterectomy. But in the case now reported the extent of the growth combined with the extensive fixation and thickening (due to cellulitis and unrecognised pyosalpinx and cystic ovaries) was so great as to appear to offer no chance of removal by the vagina. Indeed the case had been regarded as quite inoperable by a gynaecologist who has had a large experience of vaginal hysterectomy for cancer, and is one of the most successful abdominal hysterectomists, but had not, I believe, at that time ever performed the extended abdominal hysterectomy for cancer.

### DISCUSSION.

Mr. DOUGLAS DREW congratulated Dr. Spencer on the successful result in what appeared to be a most unpromising case; he concluded that the inflammatory mass was thought to be due to extension of the growth; he agreed with Dr. Spencer's technique in removing at the same sitting the fungating vaginal growth and cauterising the surface before proceeding to the abdominal section. There was a discussion some years ago at the Royal Medical and Chirurgical Society when the extended operation for cancer of the breast was on its trial and he (Mr. Drew) ventured to suggest that, as in the case of cancer of the breast, the extended operation for cancer of cervix would also prove to be superior to other methods; he had two cases well over eight years since Wertheim's operation and as far as he knew they were still well, but he had not seen them quite recently.

Dr. HERBERT SPENCER did not think Wertheim's operation was as good as vaginal hysterectomy with the cautery for *early* cases of squamous carcinoma of the portio; but for extensive growths and for adeno-carcinoma it was much better.

<sup>1</sup> A. M. Shield, "Lateney and Freedom from Recurrence after Operations for Reputed Carcinoma of the Breast, illustrated by 108 Tabulated Cases," *Med. Chir. Trans.*, 1898, xxxi, pp. 193-220. [Discussion, *Proc. Roy. Med. Chir. Soc.*, 1897-98, N.S., x, pp. 3, 44, 56.]

## Obstetrical and Gynaecological Section.

February 4, 1915.

Dr. W. S. A. GRIFFITH, President of the Section, in the Chair.

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### Sarcoma of the Cervix.<sup>1</sup>

By TREVOR B. DAVIES, M.D.

THE specimen consists of the uterus and appendages, together with a portion of the upper part of the vagina and a tumour growing from the cervix, removed from a single woman, aged 29, who gave a history of vaginal bleeding for three weeks. The menstrual periods were quite regular, every twenty-eight days, lasting four to seven days, there being moderate loss and slight pain on the first day of period. The last period ended three weeks before the bleeding began. There was no history of vaginal discharge. Bowels and micturition normal.

On examination *per vaginam* a soft, smooth, rounded, bleeding tumour was felt, growing apparently from the cervix and filling the upper part of the vagina. The body of the uterus could be felt bimanually, normal in size and position. The appendages could not be felt. Further examination under an anæsthetic showed the tumour to be growing from the anterior lip of the cervix and to be very friable.

Panhysterectomy was done by Mr. Stevens, the vagina being cut across well below the growth, and the appendages were also removed.

*Pathological Report.*—The growth, which was roughly spherical and covered by a smooth necrotic surface, in the recent state measured 2 in. in diameter. It was springing from the anterior lip of the cervix and completely hid the external os uteri from below. The growth is somewhat broken up owing to the use of tenacula to bring it into view for diagnostic purposes. Microscopically the growth is a very typical spindle-celled sarcoma. It is made up of interlacing bundles

<sup>1</sup> Exhibited at the meeting of December 3, 1914.

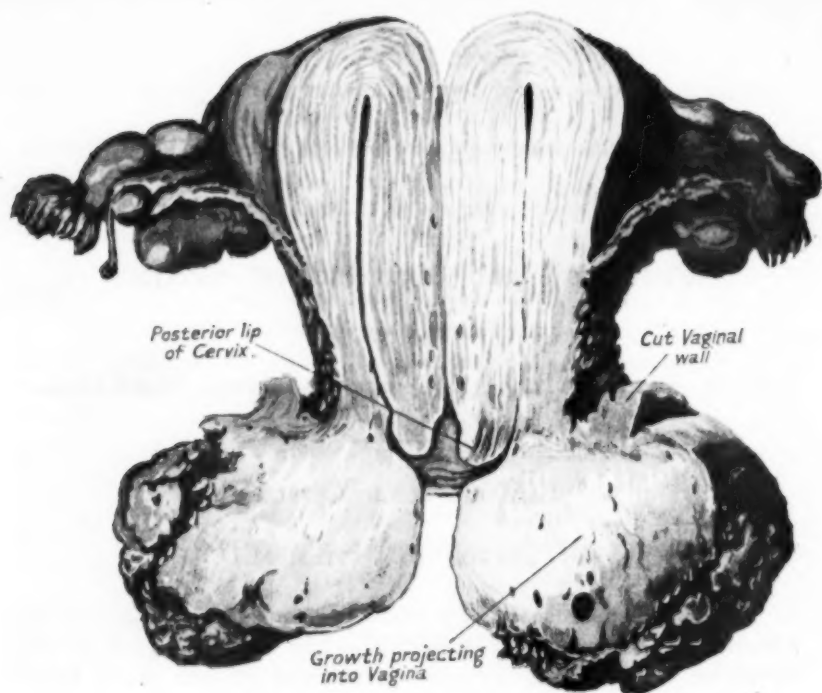


FIG. 1.  
Sarcoma of the cervix uteri.



FIG. 2.  
High power drawing to illustrate the character of the cell elements in the growth.

of large spindle cells with the scantiest stroma and thin-walled blood-vessels. Necrosis has only occurred on the surface, whilst the base of attachment shows infiltration of the cervical tissues. There is, however, no spread whatever above the line of vaginal attachment and the parametric tissues are unaffected.

I have to thank Mr. Stevens for allowing me to bring this case to your notice.

#### DISCUSSION.

Dr. HERBERT SPENCER said the specimen certainly looked like a sarcoma, both to the naked eye and under the microscope. If it were a sarcoma he would expect it to recur. He thought it was a mistake in technique not to remove the growth first by the cautery; this would have permitted the vagina to be closed by clamps, and would have lessened the risk of local implantation.

Dr. EDEN said there was a good deal of force in Dr. Spencer's criticism of the technique of the operation which had been performed. In such cases the first step should be the removal of the vaginal growth by cutting and scraping, to be followed immediately by the abdominal part of the operation. A bulky cervical growth greatly increased the difficulty of a Wertheim's operation, as was shown in Mr. Stevens's case by his inability to use the vaginal clamps. Its removal as a preliminary step was a definite advantage, and he preferred to carry out the whole procedure at a single sitting. A two-stage operation allowed time for cancer dissemination to occur after the removal of the cervical growth, and this was opposed to the principles upon which malignant growths should be dealt with.

*Report of the Pathology Committee.*—The Committee agree with the reporter that the growth is a spindled-celled sarcoma.

### **Sarcoma of Broad Ligament.<sup>1</sup>**

By TREVOR B. DAVIES, M.D.

PATIENT, aged 51, was admitted under Mr. Drew on October 16, 1913, complaining of pain in the lower part of the abdomen on the right side for six months. The pain gradually increased in intensity and occasionally went through to the back. Patient had had two children, the second nineteen and a half years ago. Menopause took place one and a half years ago. There was no history of bleeding or discharge from the vagina since that time.

<sup>1</sup> Exhibited at the meeting of December 3, 1914.

In March, 1910, patient had an attack of appendicitis, and was operated upon by Mr. Drew, the appendix being removed. There was no history of any other illness.

Examination of the patient showed the appendix scar to be a little tender to the touch; the right kidney was also freely mobile. *Per vaginam*: To the right of the cervix and slightly posterior was a hard, fixed mass, the size of a large walnut, which bulged down the vaginal roof on that side. The uterus was normal in size and position and quite separate from the mass. Left tube and ovary not felt.

Operation, October 28, by Mr. Drew: Abdomen opened in mid-line above the pubes, and a tumour was found between the layers of the broad ligament on the right side close to but not connected with the uterus. The broad ligament was incised over the tumour, which was shelled out with the finger. The opening in the broad ligament was closed by continuous suture after ligaturing a few bleeding points.

The patient was examined on November 13, just before leaving hospital, and a mass was felt in the right broad ligament as before, but now more fixed.

*Pathological Report.*—The tumour removed is roughly globular, and measured  $2\frac{1}{2}$  in. in diameter. It is pale in colour and fairly firm in consistence. The surface of the tumour is somewhat nodular—one large nodule projecting about half an inch. On section the tumour presents the same pale colour and is uniform in consistence. There are no hæmorrhages into the tumour and no vessels are seen cut across in the section. Microscopically the tumour is a typical spindle-celled sarcoma composed of large spindle cells arranged in bundles without any fibrous stroma, but with numerous thin-walled blood-vessels.

*Further History of the Case.*—Patient was re-admitted on April 16, the abdominal pain having become worse again and the abdomen was increasing in size. A hard, tender, fixed mass was found reaching nearly to the umbilicus and filling the pelvis below. April 17: Mr. McGavin inserted a tube of radium into the growth (in Mr. Drew's absence) through an incision in the left iliac region. The tube was removed in twenty-four hours. Much distension of the abdomen occurred for the next fourteen days, but otherwise the physical signs were as before. Patient returned home and gradually became worse. The pain increased in intensity and the patient rapidly got thinner and weaker. Constipation now became rather marked, the bowels being opened with some difficulty. The abdominal tumour increased in size, became very tender, and finally caused partial obstruction of the bowels after an attack of diarrhoea.



There were no definite chest symptoms, but some slight bronchial irritation towards the end, which occurred on July 7, nine months after being first seen at the hospital. No post-mortem could be obtained.

I have to thank Mr. Drew for allowing me to bring this case to your notice.

Mr. DOUGLAS DREW said there was little to add to the interesting record Dr. Trevor Davies had given of this rare tumour, the nature of which was not recognised either before or at the time of the operation. It formed a smooth, rounded mass about the size of a tangerine orange to the right side of the cervix, and caused marked bulging of the vaginal wall. It was explored through an abdominal incision and found to lie beneath the peritoneum at the base of the broad ligament and was unconnected with the uterus or ovary; it was readily shelled out of its areolar bed after incising the peritoneum covering it. On section the tumour presented a firm fleshy surface with yellowish patches, which suggested that it might prove to be an example of that rare condition of an adrenal rest tumour situated in the pelvis. He was much surprised when it was reported to be a sarcoma. For some four months the patient appeared to be free from recurrence, and during this time they had endeavoured to obtain radium treatment for her. At the end of this period and in the course of a month rapid recurrence took place and a large mass was found above the pubis. A radium emanation tube was inserted into it through an abdominal incision, but it did not produce any result, the mass continuing to grow and causing death about two months later.

*Report of the Pathology Committee.*—The Pathology Committee agreed with Dr. Davies's description of the tumour as a spindle-celled sarcoma.

### **Double Ureter simulating a Parovarian Cyst in the Right Broad Ligament.<sup>1</sup>**

By CUTHBERT LOCKYER, M.D.

THE patient from whom this curious pathological specimen was removed was a woman, aged 63. She had been married forty-two years, and had had four children, the youngest being aged 30.

In 1895, at the age of 43, the patient suffered from dysuria, menorrhagia, and bearing-down pains. She became an in-patient at

<sup>1</sup> Exhibited at the meeting of December 3, 1914.

the Samaritan Hospital, where Dr. Amand Routh removed an intra-uterine polypus. Since the operation the menses had ceased. In 1897 Dr. Routh discovered a tender, hard, movable body in the pouch of Douglas. It was thought to be a pedunculated fibroid. Two years ago the patient suffered from frequent and painful micturition. In November, 1912, Dr. Amand Routh found the right kidney enlarged and tender, and suspected pyonephrosis. An examination of the urine at that time, by Dr. L. A. Routh, showed the specific gravity to be 1015, reaction acid, albumin a faint trace, sugar absent. The microscopic examination of the centrifuged deposit showed the presence of a small number of minute bacteria, a few of which presented evidence of motility. There were also a few pus cells present (eight seen in examination of two slides). No crystals or casts were detected.

The patient was admitted into Charing Cross Hospital on January 22, 1913, and remained there for ten days under the care of Dr. T. W. Eden. On examination it was found that the right kidney was enlarged and tender and a movable swelling in the right iliac region was noted. On vaginal examination the cervix uteri was healthy and not much atrophied; the uterus was small and anteverted; it was felt with difficulty. On the left side a fixed nodular swelling was felt in the utero-sacral fold. On the right side nothing abnormal could be made out. Examination of urine in the ward revealed the presence of "thread-like flocculi," but no albumin or sugar was found. The report from the clinical laboratory recorded an absence of pus cells, but *Bacillus coli* grew on cultures. A vaccine was prepared and eleven injections were given. The temperature during the ten days in hospital was nearly normal, only twice rising to 99° F. at night.

At the end of February, 1913, Dr. L. A. Routh again examined the urine and found that the reaction was markedly acid—specific gravity 1016, and there was a "decided cloud" of albumin, also a "certain amount of pus." Some of the pus cells were undergoing degeneration. A bacilluria was present, the bacilli were mostly motile, and were not present in large numbers. Casts and crystals were absent.

The patient was first seen by Dr. Lockyer in April, 1913, when a hard, tender lump was felt in the left fornix. The uterus was semi-fixed. The examination caused pain and was therefore somewhat difficult to carry out. No abdominal swelling was noted. By February, 1914, the lump which was known to exist on the left of the uterus had increased in size and was more tender than when felt on former occasions. A fresh symptom had developed—viz., uterine hæmorrhage, which con-

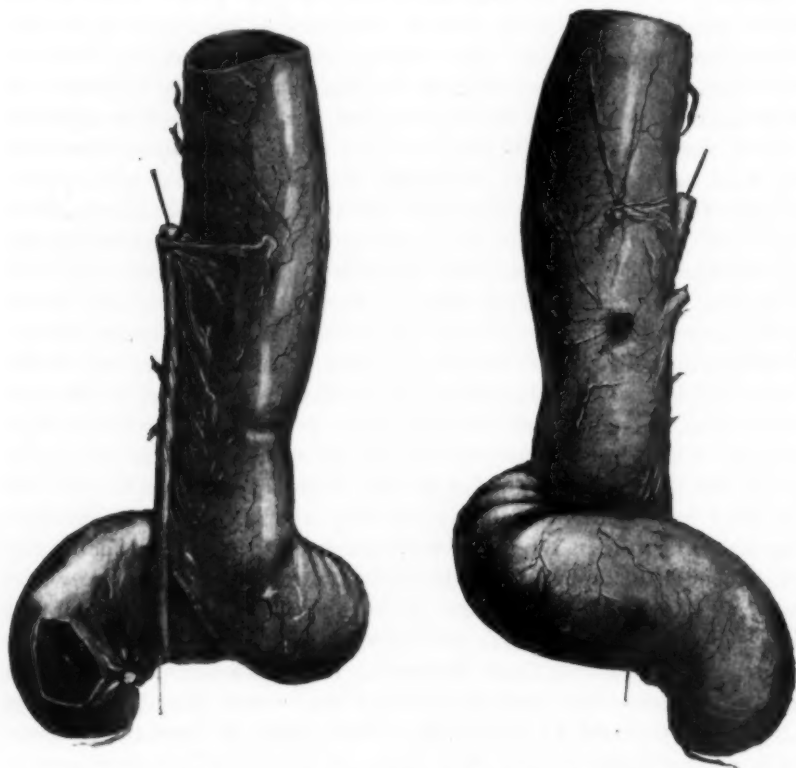
tinued for five days. Dr. Lockyer advised operation, and the patient then consulted Dr. Arthur Giles, who concurred, and expressed the opinion that the lump was a subperitoneal fibroid associated perhaps with commencing uterine carcinoma. The operation was performed on April 1, 1914. A hard calcareous tumour was found lying in the floor of the pelvis, adherent to the rectum and to the back of the left broad ligament. It had the size and shape of a jargonelle pear. Above it, but quite separate and distinct, was a solid ovarian tumour lying in the normal ovarian situation. This tumour measured 5 cm. by 3.75 cm. by 3 cm. The outer surface was smooth but markedly lobulated; it was regarded as a small fibroma. These structures, together with the uterus, were removed. On the right side the broad ligament was filled by what appeared to be a parovarian cyst. On opening up the peritoneum to dissect the cyst the latter was found to possess a limb which ran above the pelvic brim; upon tracing this upwards underneath the peritoneum of the posterior abdominal wall it was soon discovered to reach the pelvis of the right kidney. Having regard to the fact that a panhysterectomy had already been performed, and an adherent tumour had been dissected from the rectum, it was thought best not to remove the right kidney. The cystic ureter (hydro-ureter) was therefore clamped above near the renal pelvis and below near its entrance into the bladder. Ligatures were applied beyond the clamps at the proximal and distal ends and the ureter removed with the clamps *in situ*. After all raw surfaces had been covered by peritoneum the abdomen was closed in layers. The fluid in the ureter was turbid and offensive, in fact it was typical stagnant septic urine. At the bottom of the enlarged ureter were two calculi, which explained the obstruction that had caused the cystic enlargement. The duct was twisted upon itself at the junction of the lower with the middle third, and on its inner and posterior aspect was a second duct of the size of a normal ureter (*see figure*). This was subsequently proved by microscopic examination to have the structure of a normal ureter.

It may be mentioned that the larger dilated duct gave distinct vermicular movement on being stroked with the handle of the scalpel, and also showed the delicate tracery of vessels so characteristic of a ureter; its true nature was obvious, therefore, as soon as the dissection for its removal was carried above the brim of the pelvis. The diameter of the dilated duct measured nearly 3 cm. Owing to the fact that it was doubled upon itself in that part which lay in the right broad ligament, the dilated duct appeared in that position as a cyst of the size of an

50 Lockyer: *Double Ureter simulating Parovarian Cyst*

orange. The dimensions, as shown in the drawing, do not convey an accurate impression of the findings at the operation, because it was not possible to inflate the tube to its original size after the contents had escaped.

As already stated, the contents were septic; it was therefore not altogether surprising that six weeks after operation a perinephric abscess



Double ureter simulating a parovarian cyst in the right broad ligament.

developed. This was opened in the loin on May 25, 1914, after which the patient made a good recovery.

The tumour adherent to the floor of the pelvis, to the left broad ligament, and to the rectum, proved to be a calcareous fibromyoma. Its shape suggested that it once had a pedunculated attachment to the uterus.

The ovarian tumour, which was regarded at the operation as a fibroma, proved to be a malignant growth of considerable histological interest, so much so, that its description will be deferred, and will be made the subject of a later communication.

The source of the uterine hæmorrhage was subsequently found to be two fundal myomatous polypi and general polypoidal hyperplasia of the endometrium. The corpus uteri showed no evidence of malignancy.

Dr. AMAND ROUTH added the following notes to the remarks made by Dr. Cuthbert Lockyer: He first saw the patient in 1895 and removed a mucous polypus. She then complained of burning pain on micturition and pain on defæcation. In 1897 the patient was found to have a hard, tender, movable body in the pouch of Douglas. It was thought to be a pedunculated fibroid. In 1899 there were several sharp, sudden pyrexial attacks accompanied by acute pain. On examination, the right kidney was loose and large; there was some tenderness over the region of the appendix. The uterus was fixed by a hard tender mass, which obscured the lump felt in 1897; it was thought to be an inflammatory exudation. Dr. Routh again saw the patient in November, 1912; she complained of constant sacral pain, dyschesia and dysuria. The right kidney was large, mobile, and very tender; the uterus was still fixed. In January, 1913, the patient was sent to Charing Cross Hospital, where Dr. Eden found a *Bacillus coli* infection of the urine and ordered vaccine treatment. Evidence of tuberculosis was found in the lungs.

### Cases of Inversion of Uterus.

By R. DRUMMOND MAXWELL, M.D.

CASES of inversion of uterus warrant a clinical record for several reasons:—

- (1) The extraordinary rarity. No cases have been admitted to the London Hospital for the last fifteen years.
- (2) The divergent views expressed on the treatment of such cases.
- (3) A tendency in modern literature to invoke surgical treatment as opposed to the classical treatment by reposition associated with the names of Aveling and Matthews Duncan.

## CASE I.

The first case referred to is of the "chronic" variety, and concerns a patient, aged 24, married two years, primigravida; seen by Dr. Lewers, July, 1912. No special history was obtained from the patient. Instrumentally delivered under chloroform. The patient had no knowledge of third stage complications.

She was admitted owing to free hæmorrhage three days after labour. A mass the size of a foetal head projected through the cervix into the vagina. There was no obvious sepsis; the uterine surface was clean; there was retention of urine, 35 oz. were drawn off by the catheter. The peritoneal "cup" of the inverted uterus was easily felt. Dr. Lewers saw the patient next day and tried manual reposition, but did not persist in this owing to the severe pain caused thereby.

The hæmorrhage was checked in hospital during the next three or four days by repeated local douches. She was sent to a convalescent home fourteen days later, to come up again in a few weeks for further treatment. She did not, however, come until January, 1913 (that is, four months' interval instead of one month), stating that she was fairly well until her period came on at the fourth month, and then she bled so freely that she became alarmed, and returned to hospital. On examination the involution was found to be fairly good, although the fundus was still as large as a golf ball, and projected for  $2\frac{1}{2}$  in. into the vagina. Under chloroform Aveling's repositor was applied, with a large cup which fitted easily over the protruding fundus. It was left in overnight and taken out next morning. A considerable reduction of the inversion was noted. In forty hours' time, after five re-applications of the repositor, the fundus was now well within the cervical canal. To avoid difficulty in removal of the cup from the re-inverted uterus a smaller cup was used for the final stages, and its ascent carefully watched. In forty-three and half hours from the commencement of these manipulations the uterus was found to be in its normal position. An interesting rise of temperature commenced from the day of final reposition of uterus, and lasted for eight days, varying between  $103^{\circ}$  F. and  $99^{\circ}$  F. This temperature gradually subsided, and the last three weeks of the patient's stay in hospital was apyrexial.

The patient has recently been heard of, and is in good health. No subsequent pregnancy has been recorded.



## CASE II.

The second case recorded is of the acute variety. The patient was admitted to hospital on October 21, 1914, with a very grave anæmia and serious flooding. She had been delivered three days before, and had been sent to hospital with the diagnosis of septicæmia. The patient's appearance and condition before vaginal examination were most suggestive of that diagnosis.

Details of the obstetric history are as follows: The patient, a primigravida, aged 24, had been delivered three days previously. Forceps had been applied. There was some difficulty in connexion with the third stage. Apparently the placenta had not been removed manually.

I examined the patient at 1 p.m. The bladder was emptied by catheter. A large mass was felt in the vagina and delivered externally. It was smooth over the greater part of the surface, but its lower pole was covered with necrotic tissue, fibrin, and placental shreds, which were still firmly adherent. There was intense fœtor, and very free hæmorrhage during examination. *Per abdomen* the peritoneal "cup" could be readily detected. It was impossible at first to get even a finger-tip from below through it. The inversion appeared to be "complete." From below, the uterine body, which was long and flask-shaped, narrowing at its neck to the diameter of a five-shilling piece, was firmly squeezed with hot towels to reduce its œdematous bulk. The foul clots and shreds were picked off the fundus, but it was difficult to determine the right plane of cleavage of the placental relics, and as this appeared to run rather too deep into the uterine wall further separation was not persisted in, and attempt at reduction was begun by pushing up a small portion at the side, and inverting it through the cup. One finger-tip carrying the lateral wall of the uterus in front of it was eventually felt *per abdomen*. This process was proceeded with all round the ring from below, till eventually four fingers pushed through the ring from below could easily be felt by the abdomen. The fundus of the uterus, which now lay about the level of the cervix, gave rise to little further difficulty. The complete reposition of the uterus from first to last took about forty minutes. A very considerable amount of force had to be used at the start to dilate the ring from below, but once this had been effected no further difficulty was experienced. There was little shock on the whole following these manipulations.

The subsequent progress of the case was as follows: The patient

stood the manual reposition well on the whole considering her profoundly debilitated condition. The next day there was naturally very considerable hypogastric tenderness, for the counter-pressure exerted from above had not been inconsiderable. Although the discharge from the uterus still remained reddened, there was at no time any further loss that could be considered severe. The discharge remained foul, though even this improved considerably with intra-uterine irrigation. Patient remained in a very weak, exhausted state for the next seven days, and a diarrhoea, undoubtedly of toxic origin, retarded her convalescence. On the twelfth day patient developed symptoms of a pulmonary embolism, sudden severe pain on the left side, crepitations, and rusty sputum. These signs were not progressive, and the patient still seemed to have a desperate chance of recovery till on the sixteenth day a sudden left hemiplegia occurred and she died in a few hours. A blood culture taken on the thirteenth day showed no positive growth of micro-organisms. The hemiplegia, in the absence of a post-mortem investigation, must therefore be attributed either to a thrombosis secondary to her anæmia or to cerebral embolism.

Several points of interest arise for discussion. It will be noticed that both cases were accompanied by retention of urine. This is remarkable, considering the fact that the bladder practically never shares in the displacement, though its anatomical relations with the uterus would rather lead one to believe that this would always occur. On the whole, I am inclined to attribute the retention of urine, certainly in the acute case, to collapse and exhaustion.

The points I would submit for discussion on the treatment of the acute case are two in number:—

(1) Is it advisable as a general procedure to attempt reduction of an acutely inverted uterus as late as twenty-four hours after this displacement has occurred?

In answer to this question, I would suggest that, in my opinion, as a general rule, such treatment will not be wise, but a complicating factor, such as excessive bleeding from the tumour, may always render a clear decision on this point difficult (as in my case). I felt I could not, with an easy conscience, abandon to expectant treatment a patient who had already suffered grave bleeding—and bleeding, moreover, which was still persisting in a lesser degree.

(2) Is manual reposition of an inverted uterus (in the acute stage) indicated in the presence of septic metritic changes in its wall?

Were this the sole factor to be considered the answer would be, I think, quite definitely, that such manipulations are strongly contra-indicated. But one of the unfortunate (or fortunate) considerations of so many urgent obstetric problems is that the accoucheur is left so much wiser after the event than before. Here was a uterus that appeared on the third day to be well-nigh strangulated. Its neck was narrowed down to the calibre of a five-shilling piece, and comprised in its circumference not only the cervical walls but the essential blood supply of the uterus in the broad ligaments. Perhaps I had an excessive fear of a total necrosis of the lower pole of the uterus which would not have occurred, but I am now convinced that, regarded from the point of view of septic uterine changes, the expectant attitude is the one that should have been adopted. That course has been followed out in a subsequent case admitted (under the care of my colleague, Dr. Russell Andrews) in the acute stage. Involution is, I believe, proceeding satisfactorily, and the patient will shortly be readmitted for reduction of the "chronic" displacement with Aveling's repositor.

It is a point of some interest to note that after an interval of close upon eighteen years three cases of the "acute" variety have been admitted in less than two years to the London Hospital. I believe on the whole that this displacement is not so rare as statistics would suggest, and that view is, I think, confirmed by the numbers of Fellows present to-night who have related their personal experience of the condition.

#### DISCUSSION.

Dr. HEDLEY said that he had had two cases of chronic inversion of the uterus, both in January, 1913. Both cases were of about five months' duration and followed labour; both patients were profoundly anæmic, and in both the inversion was complete, only a narrow collar formed by the vaginal portion of the cervix being felt round the stalk of the tumour in the vagina. The first case was in St. Thomas's Hospital, and as there was no Aveling's repositor in the Hospital a prolonged attempt at manual reduction was made. This failed and caused free bleeding. He therefore decided to open the abdomen and reduce the inversion by incision of the posterior lip of the cup formed by the inverted uterus; a mesial cut about  $\frac{3}{4}$  in. in length was made with scissors, when the inversion was reduced with the very greatest ease. The wound in the lower part of the uterus and upper part of the vagina was sutured with catgut. The second patient he sent into St. Thomas's Home, and after trying manual reduction did the same operation as in the first. Both patients

recovered without any bad symptoms, were able to go home within three weeks of operation, and were in good health when last heard of some months later.

The PRESIDENT (Dr. W. S. A. Griffith) remarked on the importance of Dr. Maxwell's communication. The subject had not been discussed for many years in the Section. Cases of "chronic inversion" (by which he meant chronic induration, all cases of inversion being acute in their occurrence) were rare. He recalled only three, and he had reduced them by Aveling's repositor, the essential details for success being the accurate fitting of the cup to the inverted fundus and the maintenance of a gentle elastic and continuous pressure in the right direction. This should cause very little pain. Complete inversion, which was present in the case referred to by Dr. Hedley, would be much more difficult to reduce until the fundus could be returned through the cervix, the dilated cervix keeping the cup afterwards in position.

Dr. AMAND ROUTH had seen about a dozen cases of inversion of the uterus, almost all chronic, and had never failed to be able to reduce the uterus by means of Aveling's repositor. All but one of these were hospital cases, and the success was mainly due to the keenness and skill of the house physicians, for several cases took more than thirty-six hours before reduction, and in some cases pain and restlessness had to be relieved by morphia. So far he had not seen a case of acute or chronic inversion requiring abdominal section.

Dr. BRIGGS pleaded for the surgical precision and safety of a central posterior incision *per vaginam* starting from the posterior fornix and continued into the cup of the inversion for one-third of its extent. The incision was originally described by Küstner. The divided portion of the uterus was accessible for effective catgut suture and a vaginal drain of the pouch of Douglas was provided. This treatment ought to be included in all works on operative gynaecology, particularly for obstinate old-standing cases of chronic inversion such as the one Dr. Briggs instanced of two years' standing in a young woman, aged 23. When necessary, it was safer to divide the sac of a hernia than to damage its contents.

Mr. COMYNS BERKELEY had seen four cases of chronic inversion of the uterus. In the first case the Aveling's repositor as supplied by the surgical instrument maker was not successful owing to the fact that the "cup" would not fit the inverted fundus. A model in bar-soap was taken of the fundus and a "cup" of the proper size turned from it, with a very satisfactory result. In the second case a special "cup" was turned in the first place and by its means the inversion was easily reduced. In the third case the inversion became spontaneously reduced whilst the "cup" was being made. For the fourth case Mr. Berkeley prescribed hot douches twice a day, and ergot, in the hope that, as in the third case, the inversion might become spontaneously reduced, which after some days' treatment did take place.

Dr. HERBERT SPENCER thought the second case showed the danger of immediately reducing a recent inversion (after, say, the first twenty-four hours) especially when the uterus was septic. He had called attention to this danger in the *Obstetrical Society's Transactions* (vol. xlv) and had recommended continuous douching for a time until the uterus had partly involuted and become clean. He had also recommended this orally to Dr. Lockyer, who had, he believed, used it with success. His own experience of inversion of the uterus was limited to eight cases—four caused by labour, three by fibroids, and one by sarcoma—he had also seen five cases under the care of Sir John Williams. His cases had all recovered except the sarcoma, which recurred after hysterectomy. Of the four puerperal cases, the first when seen had a green and putrid placenta and membranes still adherent to the inverted uterus on the nineteenth day. After gentle removal of the after-birth under continuous irrigation the inversion was gradually spontaneously reduced. The other three cases were reduced by Aveling's repositoir. In one of these seen on the fifth day, sapræmic and gravely anæmic, continuous irrigation was used, and then the inversion was reduced by the repositoir within eight and three-quarter hours on the sixteenth day. The original repositoir of Aveling was a very valuable instrument; its stem should be made of German silver, which was sufficiently rigid and yet could be bent without difficulty: the stem of the instrument exhibited was too rigid. The disadvantage of Dr. Galabin's cylindrical cup (he was, as Dr. Routh said, in error in calling it conical) and of the conical cup which Dr. Blacker had devised, appeared to the speaker to be that they interfered with the frequent examinations which were necessary to make sure that the cup was in place. While the cup was in proper position pain was slight, but as soon as it slipped and pressed on the fornix there occurred pain and danger of sloughing. It was also necessary that the cup should not be long in the uterus after reduction of the inversion. The proper way to remove the cup (by continuous traction) was shown them by Dr. Handfield-Jones at the Obstetrical Society in 1889, and he remembered well the impression which the simple and ingenious suggestion made upon the meeting and upon Dr. Matthews Duncan who was present. Inversion of the uterus was so rare that no one had a large personal experience of it. He would advise the younger members of the Section to study the Index volume of the *Obstetrical Transactions* before deciding on the treatment of rare conditions. His own opinion was that cutting operations were very rarely indicated or justifiable in the treatment of inversion and seriously endangered the life of the patient if subsequently pregnancy occurred. After the simple reduction by continuous pressure many cases of normal pregnancy and labour had been observed, in one case after the uterus had been inverted for nearly twelve years. Nevertheless, he believed that pressure in a recently inverted and septic uterus was very dangerous, and he would again strongly advise resort to continuous irrigation until the uterus had partly involuted and become firmer and clean.



Dr. MAXWELL was very gratified to find that this obstetric subject had provoked such keen interest and discussion amongst the Fellows. Dr. Griffith had referred to spontaneous reposition of the uterus. The speaker had not been aware of this interesting sequel until he had made a search some time ago through the literature, when he had found several cases recorded by Ramsbottom, where this had undoubtedly taken place several years after the original displacement, and one of these cases had been followed by a normal pregnancy. Dr. Maxwell was glad to find that in Dr. Routh's hands Aveling's repositor had met with such invariable success. Dr. Briggs and Dr. Hedley had added greatly to the value of the discussion by providing the Society with illustrations of surgical treatment of this condition. While Dr. Maxwell could not, of course, in their cases criticise this form of intervention, he presumed, however, that they would always, before they committed themselves to a laparotomy, endeavour first to use the repositor. Dr. Spencer's criticisms and remarks were very welcome, for he had great experience in this displacement and one was glad to hear his strongly expressed views on the subject. Dr. Spencer's views on the danger of such manipulations carried out on a septic uterus were clearly proved, in Dr. Maxwell's opinion, by the fate of his septic case. Dr. Spencer referred to the necessity of seeing that the stem of the repositor was of malleable material with a view to approximation of the pressure to the line of the pelvic axis. This property was certainly present in the two repositors belonging to the London Hospital. Dr. Eardley Holland had given the Society an illustration of the method he had adopted to replace the one case of this complication he had met with. When he read the paper, Dr. Maxwell had not gone very fully into the exact method which he had himself used, but his main efforts at reduction of the uterus were carried out at precisely the same spot where Dr. Holland had himself found the pressure was most efficacious. Apparently the only difference between the speaker's invention and Dr. Holland's was that the former had first canalised the ring with his finger-tips, subsequently pushing the finger through the dilated ring. One thing the speaker desired to emphasise as regards technique was that attempts at reposition by pressure, applied first to the fundus, would have been of no avail whatever, and in addition would have been associated with the gravest risk of perforating the fundus. Dr. Blacker had referred to the difficulty of removing the cup after reposition was complete. This possibility had occurred to Dr. Maxwell, and he had at hand ready for use a bougie-shaped end to be fitted to the repositor had this difficulty been anticipated, but with the smaller size of cup used and careful observation in the last stages of reduction, no difficulty was foreseen, and none occurred during its removal from the interior of the uterus. Mr. T. G. Stevens had given Dr. Maxwell some consolation as regards the fatal termination of the acute septic case. Dr. Maxwell quite agreed with him that the probability of the patient's death in any case was great, either if reposition had been attempted at once or deferred until later. Mr. Stevens did not think that septic absorption had



been much increased by the attempts at reposition, though the inferences Dr. Maxwell drew from the temperature following the reduction of the chronic case rather proved that this was not so. Mr. Berkeley's series of cases of spontaneous cure of this displacement were a most interesting contribution to the discussion, and he hoped that not only Mr. Berkeley, but all the other speakers who had contributed to the discussion, would record the cases of this rare complication which they had themselves met with.

### Squamous-celled Carcinoma occurring in a Cystic Teratoma of the Ovary.

By HENRY RUSSELL ANDREWS, M.D.

THE occurrence of squamous-celled carcinoma in a cystic teratoma of the ovary is comparatively rare. Williamson and Barris<sup>1</sup> in 1911 collected all the recorded cases they could find, and said, "We find records of and reference to thirty-two cases of reputed squamous-celled carcinoma of ovarian 'dermoids.' Of these cases we reject fourteen, of which the account is too scanty and the examination too incomplete to justify the diagnosis, or in which the original descriptions have been misquoted by latter writers." They gave accounts of four previously unreported cases. I thought that a short account and description of a case recently under my care was of sufficient interest to be recorded.

A single woman, aged 49, was admitted into the London Hospital in November, 1914. She had menstruated regularly until July, 1914, but since then the periods had practically ceased, there being only a slightly coloured discharge from time to time. She had had some swelling of both legs since July, 1914. Her general health during this time had been deteriorating, and she had had some abdominal discomfort with no pain. She had not noticed any enlargement of the abdomen until she was examined by her doctor. There was no trouble with micturition, but there had been obstinate constipation for five weeks. On admission there was some œdema of the left leg. An elastic rounded swelling, feeling like a tense cyst, rose out of the pelvis, reaching half-way to the umbilicus. It had a fair range of mobility. The cervix was normal but more or less fixed. There was a fixed, hard,

<sup>1</sup> *Journ. of Obstet. and Gynæcol.*, 1911, xx, pp. 211-229.

irregular swelling in the cellular tissue of the pelvis on the left side, extending into Douglas's pouch. *Per rectum* this mass could be felt well, and there was thickening of the left utero-sacral ligament. The uterus was pushed to the right by the swelling on the left side. Diagnosis: Probably left-sided malignant ovarian tumour. The abdomen was opened, and a left-sided ovarian cyst, larger than a foetal head, was found, which was fixed at its lower pole to the cellular tissue of the left side of the pelvis, and to the peritoneum of the left side of Douglas's pouch. The right ovary and tube were normal. There were several small fibroids in the uterine wall. The greater part of the cyst was removed, but it was impossible to separate its lower pole, and it was evident that carcinomatous tissue was broken through. There was no troublesome bleeding. The patient made an uninterrupted recovery, and stated two months after the operation that she was very well except that her constipation was still troublesome.

The greater part of the tumour was made up by a cyst, unilocular, apparently the result of disappearance of party walls in a multilocular adenomatous cyst. The lower part was evidently teratomatous, two small cavities being filled with sebaceous matter and hair. Into one of those cavities projected a solid mass continuous with the wall of the tumour. On section this mass was soft, yellowish-white in colour. Its surface projecting into the cyst was coarsely lobulated, and separated from the inner surface of the cyst by smooth white membrane, except at one part, where it projected into a loculus filled by fair hair. The whole of the outer aspect of the mass presents a rather granular surface. There were no cartilaginous nor bony elements in the cyst wall. In the section shown under the microscope, at one end of the section the cyst is lined by stratified columnar epithelium which in some places is ciliated. This epithelium suddenly gives place to a stratified squamous epithelium. Beneath the epithelium in the wall of the cyst are narrow and broad branching processes of small squamous and polygonal cells with prickly borders. Giant cells are present in some of the processes. Many of the large processes have centres filled with necrotic granular debris and fragmented nuclei; these appear to be tubular. In the deeper parts there are lobular areas of necrotic tissue. In places there are lobular areas in which the processes of squamous epithelium are arranged in a network, and are separated by a very delicate mucoid stroma.

**Ruptured Unilateral Solid Cancer of Ovary ; Ovariectomy ;  
Subsequent Pregnancies and Good Health after Seven  
Years.**

By HERBERT R. SPENCER, M.D.

A. B., A SINGLE woman, aged 27, was admitted to University College Hospital on January 2, 1907, complaining that since receiving a blow in the right side of the abdomen about a month ago the abdomen had become swollen. The blow was followed by a good deal of pain which ceased when the swelling began. Menstruation commenced at the age of 13-14, and had always been regular in occurrence and duration and normal in amount. There was a history of phthisis on the father's side.

On admission the patient was found to be rather anæmic, frail, of somewhat tubercular aspect, the breasts were well formed and virginal, the tongue clean, the urine normal; an unusually large amount of pubic hair was present. There was dullness at the bases of both sides of the thorax, but the breath sounds were well heard. The abdomen was much distended by free fluid, estimated at a gallon, and in the lower part, with its long axis nearly transverse but rising higher on the left side, was a floating tumour estimated to measure 6 in. by 3½ in. The tumour, while freely movable from side to side, could not be pushed up into the upper abdomen. The hymen was intact and lax, the uterus freely movable: some induration of the utero-sacral ligaments was present. No tumour could be felt *per vaginam* or *per rectum*.

At the operation, on January 5, 1907, a large quantity of blood-stained fluid escaped on opening the abdomen; over half a gallon was collected, but more was lost. The tumour occupied the left ovary, was not adherent, and was easily removed. After the pedicle was ligated it was stitched over with fine silk. The right ovary was examined and found to be quite normal in appearance; it was therefore not removed. No secondary growths or enlarged glands were felt. The wound healed by first intention and the patient left the hospital on February 2, 1907, well, but very thin. No abnormal signs could be made out either in the chest or abdomen.

The patient has been kept under observation by the medical attendant, Dr. Allt. In July, 1908, she was married, and has since been delivered of two living boys, in September, 1909, and in November,

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1910. She remained well in January, 1914, seven years after the operation.

At the time of removal the tumour was much congested, and so soft



FIG. 1.

A segment has been removed. The spongy appearance in the upper part is due chiefly to degeneration of carcinomatous cell masses. (Six-sevenths of natural size.)

that it was thought to be cystic; in its capsule was a tear from which bloody fluid was exuding. After hardening for a fortnight, it was found on section to be solid, of a greenish-buff colour, of somewhat waxy

surface and soft in consistence, so that it could be easily broken into by the finger.

The tumour (*see fig. 1*) measured  $5\frac{1}{2}$  in. by  $3\frac{1}{2}$  in., and had nearly the shape of an ovary, being smaller at the uterine end. The surface was smooth and free from adhesions: at one spot was a tear about 1 in. long from which bloody fluid escaped at the time of operation. On cutting a segment from it the tumour was found to be solid: part of it was pitted with small holes which give it a somewhat spongy appearance (*see fig. 1*). There was a well-marked capsule of ovarian



FIG. 2.

Photomicrograph (low power) showing masses of carcinomatous cells embedded in a scanty connective tissue stroma, from which they have in many places shrunk during hardening.

tissue around it, from one to several millimetres in thickness. Microscopically the tumour showed the structure of a typical carcinoma of the medullary variety, consisting of bands and masses of epithelial cells in a well-marked but rather scanty connective tissue stroma. The epithelial cells were of short length, cylindrical, cuboid, or oval in shape. There was practically no round cell infiltration (*see fig. 2*).

The chief features of this case are: a ruptured unilateral primary medullary cancer of the ovary with extensive hydroperitoneum (and

probably some hydropleura) treated by removal of the affected ovary only, the other ovary being left behind.

Primary soft solid carcinoma of the ovary is in my experience rare. That such a tumour, which had been ruptured, and therefore presumably had discharged some of its cells into the peritoneum, could be removed, and the patient subsequently bear children and remain well after seven years, appeared to be worthy of record and consideration, especially in view of the common teaching that both ovaries should be removed. Thus Pfannenstiel, the writer of the articles on ovarian tumours in Veit's great "*Handbuch der Gynäkologie*," has a chapter on this subject. His views are so very clear and decided that he has printed them in spaced type. He advises the removal of the other ovary in all cases of unilateral papillary tumour, cancer, or endothelioma, regardless of the age of the patient. Yet in all three of these conditions I have known unilateral ovariectomy result in "cure" (by which I mean that the patients have remained well for more than seven years after operation), and, to confine our attention to the subject of this paper—soft solid cancer of the ovary—Hofmeier and v. Velits have published cases similar to that now recorded, except that in their cases the tumour was not ruptured. Hofmeier's case<sup>1</sup> was one of adherent soft solid cancer of the ovary in a patient who had a child (and remained well eighteen years) after unilateral ovariectomy. v. Velits's case<sup>2</sup> was that of a girl, aged 17, operated on by unilateral ovariectomy for soft solid cancer of the left ovary: the right ovary, of the size of a bean, being left behind. The patient remained well thirteen years afterwards, having in the meantime had four children whom she had suckled. The tumour had a stroma of spindle cell connective tissue thickly permeated with cancer-nests of small cylindrical cells. These three cases are sufficient to show that Pfannenstiel's dictum that in all cases of unilateral cancer of the ovary the other ovary should be removed is too absolute: if it had been acted upon it would have deprived these three patients of the chances of maternity. In another case in which I removed the uterus and both ovaries for a densely adherent carcinomatous tumour of the left ovary, the right ovary was found to be free from growth and the patient was well nine years later. On the other hand, in a case of unilateral ovariectomy for solid carcinoma of the left ovary in a young

<sup>1</sup> *Verhandl. der deutsch. Gesellsch. f. Gynäk.*, 1905, p. 298; and *Trans. Amer. Gyn. Soc.*, 1909, p. 338.

<sup>2</sup> *Archiv. f. Gyn.*, 1906, lxxix, p. 571.



girl, aged 16, the right ovary appeared to contain distended Graafian follicles, but to be otherwise healthy: it was not removed. Recurrence occurred, and at the post-mortem examination a cancerous tumour measuring 11 cm. by 8 cm. was found in the organ which had been left behind.

What is required is some criterion as to when an apparently healthy second ovary should be removed and when left in a case of unilateral solid cancer of the ovary. Though I am not in a position to furnish such a criterion and have limited myself to the publication of a *pièce justificative*, yet I am not without hope that a careful study of cases of primary soft solid carcinoma by members of this Section may enable us in time to obtain such a criterion. These cases are, I think, rare; they keep the shape of the ovary and do not attain a large size. In my case there was a marked absence of round cell infiltration; in this respect it differed strikingly from the case of the girl aged 16 which recurred, in which the round cell infiltration was marked. Although the amount of round cell infiltration in cancer varies greatly in different cases, its presence or absence may possibly help us to decide on the malignancy of this particular case of soft solid cancer of the ovary. I think no one would deny that the structure of the tumour in the case now recorded is that of a typical soft medullary carcinoma; but the question arises whether, notwithstanding its structure, it really is cancer at all, or whether it is a non-malignant growth. It certainly is curious that these tumours usually are of comparatively small size and have a distinct capsule, retain more or less the shape of the ovary, and may not recur, even when adherent, as in Hofmeier's case, or ruptured, as in the case now recorded.

#### DISCUSSION.

Dr. CUTHBERT LOCKYER said that he was not convinced from a casual examination of the microscopic section of Dr. Herbert Spencer's specimen that it was a carcinoma; he thought it would very likely prove to be an endothelioma, and if that were so, the long immunity from recurrence would be more easy to understand, as endothelioma of the ovary was far less malignant than solid carcinoma of that organ.

Dr. BRIGGS remarked that the tumour shown and admirably described by Dr. Herbert Spencer stirred up the unsettled problem as to what these tumours really were. As solid adenomata, in the Departmental Museum of the Liverpool University, Dr. Briggs said he had had them illustrated and

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catalogued for over fifteen years; repeated and recent revisions of the catalogue had left them as they were, awaiting any more acceptable advance in histology.

Dr. AMAND ROUTH asked how Dr. Spencer proposed to decide whether the removed tumour was malignant or benign at the time of operation, and what course he would now pursue as regards the second ovary, if he decided that the one removed was carcinomatous.

Dr. HUBERT ROBERTS thought the question of removal of an apparently sound ovary on one side, after the removal of what appeared to be a malignant ovary on the other side, was a very difficult one. Dr. Roberts asked Dr. Spencer why, after finding the diseased ovary in his case to be malignant by microscopical examination, he had not removed the other ovary by a subsequent abdominal section, or did Dr. Spencer think such a proceeding was unjustifiable?

Dr. SPENCER said he saw no evidence that the tumour was an endothelioma: structurally it was a typical medullary carcinoma, and it did not resemble microscopically the endothelioma he had met with in a dermoid. Nor was it in the least like the fibro-adenomata alluded to by Dr. Briggs, which were hard tumours and not brain-like in consistence as in this specimen. In reply to Dr. Amand Routh's questions, Dr. Spencer thought in the case of such a soft tumour as the one shown (which in the fresh state resembled a spleen) it would be difficult to cut satisfactory rapid sections at the time of operation. He had not *yet* decided whether the tumour was malignant or benign, but had made a suggestion on that point in his paper. A similar case he would treat similarly. If the ovary, apparently normal at the time of operation, grew subsequently he would remove it; but with very little hope that malignant disease affecting both ovaries would not recur.

*Report of the Pathology Committee.*—Dr. Spencer's specimen of "Cancer of the Ovary" was examined by the Committee, who reported that they agree with the description of the author.

## Obstetrical and Gynaecological Section.

May 6, 1915.

Dr. W. S. A. GRIFFITH, President of the Section, in the Chair.

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### Specimen of (?) Rhabdomyoma of the Vulva.

By T. G. STEVENS, F.R.C.S.

THE tumour, removed from a patient, aged 36, was the size of a small orange and had existed and slowly enlarged for the past three years. It was situated at the posterior part of the labium majus and was not pedunculated. The skin over it was thinned and on the point of breaking. Microscopically the tumour is composed of a delicate fibrillated stroma, enclosing elongated masses of protoplasm with oval nuclei but no very clearly defined cell outlines. The general appearances of these protoplasmic masses is that of immature striated muscle. There is some longitudinal striation to be seen, but no transverse striation can be demonstrated. The stroma in parts is degenerate and shows some liquefaction and minute cyst formation. The tumour is encapsuled and shows no evidence of malignancy.

### DISCUSSION.

Dr. CUTHBERT LOCKYER asked Mr. T. G. Stevens whether he considered that the term "rhabdomyoma" was applicable to a tumour in which no muscle with transverse striation had been demonstrated?

Dr. HERBERT SPENCER thought the term "rhabdomyoma" could not properly be applied to a tumour in which transverse striation of the muscular fibres was not demonstrated. He had seen nothing in the microscopic slides which indicated that it was anything but a much degenerated ordinary fibromyoma of the vulva.

Mr. BLAIR BELL agreed with the exhibitor that the tumour was largely composed of developing striated muscle, which resembled that seen in the

two cases of rhabdomyosarcoma described by Professor Ernest Glynn, and himself. He suggested that striated muscle cells might be found in older parts of the tumour; but that even when present a good apochromatic 2-mm. oil-immersion lens was required satisfactorily to demonstrate the transverse striæ.

*Report of the Pathology Committee.*—"Mr. Stevens's specimen of rhabdomyoma of the vulva was examined. The Committee found that it was composed of a stroma of œdematous connective tissue containing thick strands of protoplasm with large oval or elongated nuclei. The appearances are those of muscle tissue, but as no transverse striation can be seen, it is impossible to prove the author's contention that it is a rhabdomyoma."

### **Tubal Pregnancy showing Fœtus undergoing Dissolution.**

By C. E. PURSLOW, M.D.

THE specimen was removed by abdominal section from a married multipara, aged 31. Menstruation had been regular until twelve weeks before admission to hospital; amenorrhœa then set in and continued until a fortnight before admission, since which time there had been continuous slight loss; there had been two typical attacks of pain with faintness. On examination there was a well-marked tumour in the left iliac region. This was diagnosed as a tubal pregnancy, but the physical signs were unusual, in that the swelling was entirely above the pelvic brim and could not be reached by the finger either in the vagina or the rectum. The specimen shows the unruptured distended tube. Cross-sections have been made, and these show a diameter of  $2\frac{1}{4}$  in. The tube was filled with firm blood-clot, in the centre of which was an amnial cavity containing turbid fluid, and in this was found the macerated head of a fœtus of about ten weeks' development: no other part of the fœtus could be found. The specimen is interesting as showing that a fœtus as far advanced as this can macerate and dissolve in the liquor amnii.

### **Complete Inversion of the Vagina after Total Hysterectomy, associated with Vesical Calculus.**

By DOUGLAS DREW, F.R.C.S.

THE patient, aged 53 (two children), had a total hysterectomy nearly twelve years previously for fibroids. The present trouble came on within twelve months and she had been going about in this uncomfortable state for some ten years.

The prolapse formed a large ovoid projection about 6 in. in length; at the apex was an indurated scar; there was no ulceration. On passing the finger into the rectum it could be hooked downwards into the posterior part of the swelling. On palpating the anterior surface a mass could be felt, evidently the calculus, which was very tender, so that it was not possible to reduce the vagina without an anæsthetic. There was chronic cystitis and the urine was very foul.

With regard to the treatment, several questions of interest arose. Should the stone be removed by incising the anterior vaginal wall? This appeared to be the obvious method, in fact the procedure was almost invited, as the stone could be so readily felt, and it would have been extremely simple. On the other hand, I feared that if this were done and the bladder wall and the vagina sutured, failure of union might occur owing to the foul state of the urine and the opening being at the dependent part of the bladder; and that if a vesico-vaginal fistula resulted it would seriously interfere with any future plastic operation for the cure of the prolapse, and even if successful it would leave a scar at the site of any proposed operation on the vagina which would have been most undesirable. I therefore decided to remove the stone by the normal method of suprapubic cystotomy (if the prolapse of the vagina could be reduced).

At the operation no difficulty was experienced in reducing the vagina, but owing to the gaping orifice, which readily admitted the fist, it tended to return and was kept in position by packing in a towel. I used a transverse curved incision above the pubis to avoid the abdominal scar of the hysterectomy. There was some little difficulty in extracting the stone owing to its size. The bladder was sutured around a tube. The drainage and irrigation of the bladder soon cured the cystitis, and the wound healed in a fortnight, when the second operation, that for the cure of the prolapse, was undertaken.

It may be asked why a litholapaxy was not performed. I am not a believer in crushing when there is marked cystitis, as the condition is rendered so much worse.

Three methods of operation suggested themselves for the prolapse:—

(1) Through the abdomen, by suspending the vagina by suturing to the abdominal wall.

(2) By excision of the whole of the vaginal wall and completely closing the orifice.

(3) By denuding an area on the anterior and posterior surfaces and suturing them together so as to form a median column after the method of Le Fort.

This third course appeared to promise the best result. A strip of mucous membrane  $1\frac{1}{2}$  in. wide was removed from the anterior and posterior surfaces, beginning above on each side of the indurated scar at the vaginal apex, and extending downwards on the anterior surface to within  $\frac{3}{4}$  in. of the urethra; the denuded areas were sutured together. After this had been done it was evident that it was not enough to cure the condition owing to the wide vulval orifice, so the operation was completed by a free colpoperinæorrhaphy with suture of the levator ani muscles, the vaginal orifice being reduced to normal dimensions.

It is now almost a year since the operation and the result is most satisfactory; the space on each side of the broad median column just admits the finger.

A point on which I should be glad of information is whether a hysterectomy leaves a tendency to vaginal prolapse by removing the support afforded by the uterus and its connexions. So far as I am aware this is not the case; if I am right, it is additional evidence in favour of the view that the want of support below is the main factor in producing prolapse.

The PRESIDENT agreed that the operation for complete inversion of the vagina which Mr. Douglas Drew performed was the most effectual for the relief of the patient, but it was his practice when removing fibroids which filled the pelvis, or where there was marked vaginal prolapse associated with them, to fix the stump of the uterus, after supravaginal hysterectomy, to the abdominal wall at the time of the operation. This had proved satisfactory in preventing prolapse.



## Infundibulin in Primary Uterine Inertia and in the Induction of Labour.

By W. BLAIR BELL, B.S.

IN 1909 I demonstrated the clinical value of the extract made from the posterior lobe of the pituitary body, having previously published in conjunction with Hick experimental evidence of the physiological action of this extract on the involuntary muscles. Since that date many hundreds of papers have been published confirming the statements originally made, and suggesting further indications for the use of this preparation.

I do not propose to-night to review the work done and opinions expressed concerning the obstetrical value of infundibulin, as I have called the extract of the posterior lobe of the pituitary body; I shall reserve that for another occasion. But I wish to bring before your notice a point of some importance and one which has not been dealt with before in a definite manner. To make what I have to say clearer, it may be stated that infundibulin has established a place for itself in obstetrical practice entirely, so far as I know, owing to its power of *promoting and augmenting rhythmical and powerful contractions in the uterus during and immediately subsequently to parturition*. In other words, this extract has been used to increase the energy and efficiency of labour. I shall now demonstrate the additional fact that infundibulin is capable of *sensitizing the uterus before labour*, and if this is so it will be obvious, I think, that there are further indications of the greatest moment for the administration of this preparation. With regard to the induction of labour, it has been shown by several observers that it is rarely possible to induce abortion or labour by the use of infundibulin alone; this is especially so the earlier the attempt is made. Occasionally at full term labour may be precipitated by the administration of infundibulin, but by no means with certainty. Some time ago it occurred to me to try the effect of combining mechanical means for the induction of labour with injections of infundibulin. The results obtained have been excellent. It is well known, of course, how difficult it may be to induce abortion or premature labour by ordinary mechanical means alone, within a reasonable time. By the combination of mechanical methods with the administration of infundibulin

induction is easily effected. I do not propose to record a number of cases—indeed, my own experience has necessarily been limited; but one, owing to its gravity, may be of interest by way of illustration.

Mrs. H. was in the eighth month of gestation when she commenced to bleed from the uterus. The hæmorrhage became alarming and I was called in by her doctor to decide what should be done. The cervix was undilated, pains were entirely absent, and the bleeding was free. I found that the case was one of placenta prævia, and I advised that the uterus should be emptied. This was carried out in the following manner: The patient was anæsthetised and the cervix was dilated with Hegar's dilators until the finger could be passed into the uterus. The placenta was then felt overlying the internal os uteri, marginally. The cervix and vagina were immediately packed with gauze, and the patient was returned to bed after a full dose (1 c.c.) of infundibulin had been injected. Subsequently  $\frac{1}{2}$  c.c. was injected every twelve hours. Twenty-eight hours from the time when the pack was inserted expulsive contractions commenced. The pack was at once removed by the nurse, according to instructions, and almost immediately the fœtus, enclosed in the membranes, and the placenta were expelled together. Only the nurse was present at the time. The child when rescued from the membranes did not long survive. There was no hæmorrhage during or after delivery.

In this case dilatation and packing of the cervix were employed; but whatever the means adopted the result is the same, and the combination of bougies and infundibulin probably forms the best method of inducing labour in ordinary circumstances. The point, however, I wish to bring out now, although I shall deal with it more fully directly, when discussing primary uterine inertia, is that when possible it is advisable to administer infundibulin a few days before inserting the bougie or pack, in order to sensitize the uterus. It is, as already stated, this *sensitization of the uterus* by infundibulin that is the point of importance in the subjects under discussion, as apart from the definite expulsive effect which subsequently follows. I believe, then, that it is best, when possible, first to sensitize the musculature with infundibulin so that the bougies may be better able to induce labour, during which the contractions are made more effective by the infundibulin which has been previously administered. If, as in the case recorded above, immediate induction be desired, one must put in the bougies or pack and sensitize the uterus afterwards; in these circumstances combining the effect of sensitization with that of subsequent expulsion.

To come now to the question of primary uterine inertia. I think I may say that this condition in its worst phases presents one of the greatest difficulties with which an obstetrician can be faced. Judging from the standard writings on the subject very little appears to be known about the causal factors. Probably the statement of Munro Kerr that "Primary uterine inertia is due to inherent weakness of the uterine muscle or to errors in its innervation" best sums up the general impression made by other writers. The expression "errors in innervation" is a piece of pure guess-work which is hardly likely to be correct; while "inherent weakness" is an evasion at best. Surely, there can be no doubt that the truth of the matter lies in ordinary circumstances—and by that I mean in the absence of gross lesions or abnormalities in the wall of the uterus, within the cavity or in the neighbourhood of that organ—in the deficiency or absence of the normal stimulators of uterine contractions, that is to say, of the hormones, such as infundibulin, and of the compounds of calcium. Primary uterine inertia is, then, due to bio-chemical causes, and it should be so stated in the text-books, for recognition of this fact enables us to deal effectually with the condition. It is, of course, true that ergot and quinine have been recommended and used to stimulate the uterus. Neither, however, is found in the blood normally, and ergot is probably absolutely dangerous owing to the frequency with which tetanic contractions are produced by large doses. In calcium salts and pituitary extract we have probably the normal stimulators of uterine contractions in parturition, and by a judicious use of these substances we should be able to deal with any case of so-called 'idiopathic' primary inertia. I will relate a case in point.

Mrs. C., aged 31, who consulted me when she was eight months pregnant, gave the following bad obstetrical history: Four years previously, at her first confinement, in which she was attended by two eminent obstetricians, the child, which was killed in the process of delivery, was extracted with the very greatest difficulty. The mother herself was severely lacerated, and was very ill afterwards. She was told that the delivery of a live child at full term was impossible. I should add that this first child was supposed to be a little post-mature, and that it weighed 10 lb. At her next confinement, two years later, she was attended by another well-known obstetrician who told her induction must be performed at the thirty-seventh week. For this purpose an anæsthetic was administered four times. Finally, a bag was put into the uterus. After much delay labour commenced, and, in spite of the

induction of labour three weeks before the expected full term, the greatest difficulty was experienced in extracting the child with forceps. The patient was again under anaesthesia for a long time, but fortunately a live child weighing nearly 7 lb. was delivered. The mother was again badly torn, and this necessitated two further operations. The patient, who was most anxious to have a live child, tried to impress me with the fact that all who had attended her in the previous confinements had emphatically stated that she could not be delivered of a living child at term. I examined her, and found the pelvic measurements normal: intercrystal 11 in., interspinous 10 in., and the true conjugate  $4\frac{1}{2}$  in. (approximate). The child's head could be pressed into the pelvic brim. I noticed, however, as the patient lay on the couch on her back, that the outlines of the uterus could not be observed: the abdomen was flat, and it bulged at the sides as though it contained free fluid. The child was easily palpable, but it was impossible to stimulate contractions in the uterus by manipulation. The blood-pressure was only equal to that of 95 mm. of mercury. The blood calcium index was only 0.3. In these circumstances I felt justified in making a diagnosis of primary uterine inertia. I cannot, of course, speak with any personal or certain knowledge of her previous labours, but it appeared to me that this diagnosis alone fitted in with the facts of both, for there was almost as much difficulty in the extraction of a 7-lb. premature child in the second confinement as there had been in the delivery of a possibly post-mature infant weighing 10 lb. in the first labour. I am unable to understand why induction was performed, unless it be a fact that primary uterine inertia as the cause of her obstetrical difficulties was not recognized. In view of my observations I felt justified in telling the patient and her husband that I believed it would be possible to secure a normal delivery at full term by means of suitable preliminary treatment. I ordered calcium lactate, and infundibulin by the mouth. At the end of fourteen days when I again saw the patient the calcium index in the blood had gone up to 0.56 and the blood-pressure to that of 110 mm. Hg. The uterus showed more irritability and had a definite outline. Four days before the expected date of the confinement the patient went into a nursing home, and then received  $\frac{1}{2}$  c.c. of infundibulin injected intramuscularly, twice a day, together with calcium lactate by the mouth. The uterus showed progressive sensitiveness, so, after three days of this treatment, I reduced the dose of infundibulin to one injection of  $\frac{1}{2}$  c.c. once a day. Two days after the calculated time for the onset of labour I began to get anxious; consequently I had the patient

anæsthetised and examined her. I then found that the os was taken up and was dilating. As there had been no pains I introduced two bougies. This was at 10 a.m. At 9 a.m. she had received her usual daily dose of  $\frac{1}{2}$  c.c. of infundibulin. The same evening at 9.30 p.m. the first pain occurred, and one hour later I removed the bougies. Labour proceeded normally: the first stage was over about 2.30 a.m., and the child, which the nurse found to weigh  $10\frac{1}{2}$  lb., was born at 4.45 a.m. No assistance was given, and only a drachm or two of chloroform was administered when the head was on the perineum. The placenta came away normally ten minutes after the birth of the child. A dose of 1 c.c. of infundibulin was then injected to prevent the possibility of *post-partum* hæmorrhage. Nothing could be more straightforward or simple. The patient expressed the opinion that previously she had never had any experience of what a real 'labour pain' was like. This remark was, I think, the concluding and conclusive piece of evidence in regard to the diagnosis of primary uterine inertia as the cause of all her difficulties in the previous confinements.

So far as I know this is the first occasion on which primary uterine inertia has been diagnosed and treated before labour. If met with for the first time during labour, it would, of course, be useless to give calcium lactate, for it is only a prolonged course of treatment with this drug that can produce any effect. On the other hand, I believe that the difficulty may then be surmounted by the injection of infundibulin. At the same time prevention is always easier, and, in these circumstances especially, is much better than cure; consequently, if uterine inertia is recognised before labour, as I have shown it can be, it appears to be a simple matter effectually to deal with it.

#### DISCUSSION.

The PRESIDENT said that if the very interesting communication of Mr. Blair Bell on the use of infundibulin in a larger number of cases proved to be effectual in rendering the uterus more sensitive to direct stimulus by mechanical means which Mr. Blair Bell termed sensitizing it, it would be of the greatest value in such cases as he had described. He had found hypodermic injections of strychnine in some cases appear to act well.

Dr. R. D. MAXWELL said that all of them must have regretted, on the occasions when they had to induce premature labour, that they had had to fall back on such a crude mechanical stimulus as the bougie, and one, moreover, lacking any precision in its action. Considerations on this point necessarily led



to an effort to ascertain what was the true bio-chemical excitant of labour. Reflection on the subject suggested that, whatever the body or bodies be, its sources were probably two in origin—the internal secretion of the infundibular process of the pituitary gland together with some product of foetal metabolism; such a hormone would obviously be circulating in the maternal blood-stream. An article in the *American Journal of Obstetrics*, published five years ago, suggested that these bio-chemical properties were to be found in the serum of the full-time child, and would act as an excitant of labour contractions. The speaker had himself tested the result of this treatment, but was quite convinced that the paper had been written in too optimistic a spirit, for in twenty cases in the later weeks of pregnancy, in not one case had he succeeded in inducing labour after injections; in ten cases 10 c.c. of foetal serum subcutaneously, and in the other ten intravenously. Some of the cases had also been additionally treated with 1 c.c. pituitrin injection. As a control set of cases, in his opinion, they completely negated the value of this treatment. Mr. Blair Bell's suggestions as to the cause of primary inertia were most interesting. They were all apt to talk too glibly of various forms of inertia and to accept too readily explanations of these variations of strength of uterine contractions. For instance, the speaker held the view that secondary uterine inertia was one of the rarest phases of uterine musculature, and yet text-books conveyed quite a different impression and had rather taught the medical student to have a profound distrust of the retractile powers of the uterus. Dr. Maxwell would certainly be prepared to give Mr. Blair Bell's suggestions a thorough trial, though he would never again use bougies outside hospital practice to evoke contractions. Surely the principle of one anæsthetic, and one intervention only (dilatation with Hegar's to No. 22 and insertion of a Champétier de Ribes bag) was preferable to the insertion of one bougie after another ranging over four to five days. They ought to be quite candid in these matters: none of them gave their sole and undivided attention to the midwifery case they were in charge of if the labour dragged out over two or three days, and the embarrassment caused by these uncertainties of action of the bougie played absolute havoc with one's intervening work. As a procedure, the use of the bougie always seemed a doubtful one to the speaker when the only honest answer to the question of the patient or her husband, "How long will it be before the baby is born?" was "I don't know."

Dr. HEDLEY asked Mr. Blair Bell whether the apparently good effects, in the induction of labour caused by pituitary extract, when given in addition to the introduction of bougies into the uterus, were not more probably due to the immediate action of the extract given at the time of the introduction of the bougies rather than to that of the previous injections.

Dr. HUBERT ROBERTS asked Mr. Blair Bell as to his experience of infundibulin in Cæsarean section. Dr. Roberts said the use of infundibulin in exciting labour pains was well known to all, also its value in preventing and arresting *post-partum* hæmorrhage. Dr. Roberts's experience of infundibulin



in Cæsarean section, in cases where the operation was deliberately performed when the patient was not in labour, had not been universally favourable. In one case the uterus did not seem to respond to the stimulus of pituitrin given a few minutes before the operation was commenced, and hæmorrhage was only controlled by rapid suture of the uterine wound. In another case of Cæsarean section by one of Dr. Roberts's colleagues at Queen Charlotte's Hospital, pituitrin failed to produce uterine contractions at all, and hysterectomy had to be performed to arrest the bleeding. Dr. Roberts had no experience of infundibulin in the induction of premature labour, nor had he used calcium lactate.

Dr. DRUMMOND ROBINSON had induced labour in one case by means of bougies, plus the hypodermic injection of pituitary extract, with satisfactory results. The case was one of contracted pelvis at about the thirty-seventh week. There were reasons why it was desirable that the labour should be terminated without undue delay. It was the second pregnancy. Bougies were inserted (under anæsthesia) and a dose of Burroughs and Wellcome's pituitary extract, injected hypodermically about 9 a.m. At about 10 a.m. pains commenced, and continued until about 1 p.m., when they gradually ceased. The os was the size of a two-shilling piece. A second injection of pituitary extract was given at 2 p.m. Pains returned in about an hour, and continued until the labour terminated normally about 5 p.m.

Mr. BLAIR BELL replied.

### So-called True Hermaphroditism, with the Report of a Case.

By W. BLAIR BELL, B.S.

HERMAPHRODITISM has been a subject of interest from the earliest times, but it is only within recent years that the condition has been scientifically considered. In the study of hermaphroditism, in all its varieties, lies our hope of discovering the factors concerned in the determination of sex in the human subject, subsequently to fertilization.

It must be remembered that hermaphroditism in man is an atavistic phenomenon, and one which is never complete. Berry Hart [5] has suggested dropping the word 'hermaphroditism' and substituting 'atypical *sexe-ensemble*' for all varieties of this condition. This, however, is not desirable, for two reasons: firstly, since hermaphroditism exists normally in certain invertebrates, and is, therefore, probably only a reversion in man, the term should be preserved; and secondly, 'true hermaphroditism,' better called 'glandular hermaphroditism,' does

occur in the human subject, although Berry Hart denies that it has ever been demonstrated. We shall, ourselves, describe an example of this condition presently.

The following is a classification of 'hermaphroditism' drawn up to illustrate the forms in which this condition occurs normally and abnormally. A consideration of this scheme will demonstrate the biological significance of the condition.

We shall not discuss total hermaphroditism since it is only seen in the invertebrates. It is, of course, obvious that this variety could not exist in man. The so-called 'true hermaphroditism' in man is included in the variety known as 'glandular partial hermaphroditism' which we shall now consider.

#### GLANDULAR PARTIAL HERMAPHRODITISM.

All the recorded cases except one of glandular partial hermaphroditism which may be accepted as authentic—and we can discover only four other possible cases of this extremely interesting and rare phenomenon in addition to the one now reported by ourselves—have been found to possess mixed gonads, so-called ovo-testes, with or without irregularities in the sex characterisation of the genital ducts, external genitalia and secondary characteristics.

In 1873 Klebs [7], in his classical paper on the subject, claimed that 'true hermaphroditism,' as he called it, might occur in the following varieties in man:—

(1) *Bilateral hermaphroditism*, in which an ovary and testis are present on both sides.

(2) *Unilateral hermaphroditism*, in which there is an ovary or testis on one side, and an ovary and testis on the other.

(3) *Lateral hermaphroditism*, in which an ovary is present on one side and a testis on the other.

This classification has been adopted by many subsequent writers, and it is supported by Blacker and Lawrence [1] who in 1896 reported the first case of ovo-testis, or combined ovary and testis. They investigated the literature up to that date, and came to the conclusion that of the enormous number of supposed cases of what was called 'true hermaphroditism' there was only one—their own—recorded of the unilateral variety, after the classification of Klebs; and that there was possibly one—Heppner's [6], recorded in 1870—of the bilateral variety, and two—recorded by Schmorl [14] and Obolonsky

## CLASSIFICATION OF HERMAPHRODITISM.

## (A) TOTAL HERMAPHRODITISM.

## (I) Structural and Functional (with power of self-fertilization).

Genital glands	Functional ovary and testis	This condition is seen in various invertebrates such as Tunicata (e.g., <i>Ciona intestinalis</i> ), in some of the Trematodes (e.g., <i>Distomum</i> ), and it has been observed in the Cestoda (e.g., <i>Tenia</i> ). <sup>1</sup> Unknown in vertebrates.
'Genital ducts'	Functional male and female	
'External genitals'	Functional male and female	

## (II) Structural (with power of fertilising others and of being fertilized).

Genital glands	Functional ovary and testis	This condition is common in invertebrates (e.g., Nudibranchs and many Vermes). <sup>1</sup> Unknown in vertebrates.
'Genital ducts'	Functional male and female	
'External genitals'	Functional male and female	

## (B) PARTIAL HERMAPHRODITISM.

## (I) Glandular.

Genital glands	Ovo-testis on one or both sides	Not uncommon in some of the ungulates. Five cases known in man.
Genital ducts	Male or female or mixed	
External genitals	Male or female or mixed	

## (II) Tubular.

	EXTERNAL		INTERNAL		COMPLETE		
	Male	Female	Male	Female	Male	Female	
Genital glands	Testes	Ovaries	Testes	Ovaries	Testes	Ovaries	Common in man.
Genital ducts	Male	Female	Female	Male	Female	Male	
External genitals	Female	Male	Male	Female	Female	Male	

<sup>1</sup> This information was kindly supplied to me by Professor Herdman.

[10] in 1888—of the lateral. The evidence in regard to these, except possibly to Blacker's and Lawrence's, cannot, however, be considered satisfactory, and it has been demolished by Meixner [9] and others. Tuffier and Lapointe [17], also, in their paper published in 1911, apparently accept only the case of Blacker and Lawrence of those published prior to 1897; but they add to this case those of von Salen [12], Garré [3], Landau and Pick, [8], and Schickele [13], recorded subsequently to Blacker's and Lawrence's paper.

Pick [11], in an important paper published in 1914, discusses exhaustively the question of this so-called 'true hermaphroditism,' and comes to the same general conclusions as Tuffier and Lapointe—namely, that all the cases of this variety reported and accepted should be called 'glandular partial hermaphrodites.' This author records five cases of ovo-testis occurring in pigs, all of which he had himself examined. He states that the condition is only known in that species among all the orders of the higher mammals. Other authors, however, have published accounts of this phenomenon in moles and in other mammals. Pick also states that only four genuine cases had been recorded in man up to the date of his paper. Of those already mentioned, apparently he admits only the case of von Salen, but he adds those of Simon [15], Uffreduzzi [18], and Gudernatsch [4]. We have examined the reports of these cases and believe that only that of Simon, in addition to von Salen's, can possibly be accepted, and the former is somewhat doubtful. Altogether, then, there are at most only five cases on record which can be considered authentic—von Salen's, Simon's, Garré's, Blacker's and Lawrence's, and our own.

We shall not discuss in detail the points for and against these and the other cases reported. We have said sufficient to indicate the rarity of glandular partial hermaphroditism, but we would also call attention to the fact, to which we shall again refer later, that in most of the cases an ovo-testis has been present. In Simon's case the ovarian and testicular portions were separate. Foster has recently recorded a similar case, which, however, cannot be accepted as no histological details are given. It is interesting, also, from a critical point of view to note that all the cases of ovo-testis have had mostly feminine secondary characteristics, while Simon's and Foster's cases have been masculine in type. As we shall see, this predominating masculinity is enough to throw doubt on these two cases. Lastly, we may mention that in some of the supposed cases, such as that of Landau and Pick, large tumours have been said to be ovo-testes. Such growths can hardly be

accepted, for they must present many difficulties in the way of such a diagnosis.

We shall now describe our own case, which is probably the most fully investigated example on record, and may, therefore, be taken as a prototype of this class of case:—

S. B., aged 17, was first seen on November 8, 1912.

Past history: Menstruation had commenced during her fourteenth year; the cycle was  $\frac{3}{28}$ . There was no menstrual pain. The patient was said to have suffered from inflammation of the bowels when she was aged 7.

Present history: *She has had amenorrhœa for eighteen months, and there have been no menstrual menses. The general health is good. There has been no trouble with the bowels or bladder. The voice has been getting deeper.*

On examination nothing abnormal was felt in the abdomen or per rectum. The thyroid was found to be slightly enlarged. A diagnosis of suprarenal hyperplasia was made, and the patient was treated with ovarian and thyroid extracts for some time.

On August 25, 1914, the patient, who had not been seen for eight months, again presented herself. It was then at once noticed that she had become more masculine in appearance. *She had a slight moustache and a masculine distribution of the hair on the body (fig. 1).* There was still complete amenorrhœa.

The patient was examined under an anæsthetic a few days later. *The clitoris was found to be much enlarged, measuring 2 in. in length, and there was a well-marked prepuce. Per vaginam, the left genital gland could be felt somewhat enlarged. No tumour was discovered in the suprarenal region. Subsequently, the patient was admitted to hospital. She was then aged 19, and the amenorrhœa had lasted for over three years.*

On September 3, 1914, the abdomen was opened in the middle subumbilical line. The left genital gland was found to be the size of a plum. It had a very smooth surface and resembled a testis; the superficial blood-vessels were injected, especially in the neighbourhood of the hilum. No adhesions were present. A wedge-shaped piece was removed lengthwise from the convexity of the organ for histological examination. When cut into for the removal of this piece of tissue the organ presented a yellow, fatty appearance. The raw surfaces were brought together with a catgut suture. The genital gland on the right side appeared to be a normal, somewhat small ovary. A piece was

removed for section in a similar manner to that adopted in the case of the left genital gland. Finally, a small graft from an ovary removed from a patient operated upon a few minutes before was implanted in



FIG. 1.

Photograph of S. B. (so-called 'true hermaphrodite'). Note the hair on the legs, subumbilical region, and upper lip; also the masculine contour of the trunk and thighs.

the uterus. *The suprarenal regions were palpated with the hand in the peritoneal cavity, but beyond a slight-rough feeling in the neighbourhood*



of the left, which might have been due to the head of the pancreas, nothing abnormal was discovered.

The report from the Pathological Laboratory on the pieces excised was as follows: "Right ovary: Section shows an ovary, the stroma of which consists of very dense connective tissue, but ovulation has taken place, there being present a large corpus luteum and the scars of the corpora lutea, and also an almost mature Graafian follicle. Left ovary: Section shows what is undoubtedly a columnar-celled carcinoma with well-marked acini."

Placing an unwise faith in this report, I re-opened the abdomen on September 22, 1914, and removed both ovaries, the tubes, and the fundus of the uterus. The patient made a good recovery, but subsequently suffered from slight menopausal symptoms.



FIG. 2.

The specimen removed at operation. On the right is a normal tube and ovary, in the middle the fundus uteri, and on the left an ovo-testis and normal tube.

When I came to examine the sections myself I came to the conclusion that the left genital gland was, in my opinion, an ovo-testis, and not the seat of a malignant growth as reported.<sup>1</sup>

The specimen removed<sup>2</sup> consists of the fundus uteri, the Fallopian tubes and the genital glands, each in the position normal to the female and attached to the uterus by an 'ovarian' ligament (fig. 2). Scars

<sup>1</sup> This opinion was afterwards confirmed by the report of the Pathological Reference Committee of the Liverpool Medical Institution, signed by F. T. Paul, E. E. Glynn, J. M. Beattie, and D. M. Alexander. The author, although a member of the Committee, took no part in the deliberations.

<sup>2</sup> Now in the Museum of the Royal College of Surgeons, London.

can be seen running lengthwise along the convexity of each gland; these indicate the sites from which the pieces were excised for examination. The fimbriated extremity of the left Fallopian tube has become attached to the scar in the corresponding gonad. There is evidence also of a parovarium on this side. A portion of the ovarian graft, which on histological examination was found to be necrotic, can be seen in the anterior wall of the fundus uteri.



FIG. 3.

Section of the normal right ovary, showing a ripe Graafian follicle and bands of hyaline substance representing the remains of atrophic follicles or corpora lutea. ( $\times 60$ .)

An X-ray examination of the patient, by Mr. Thurstan Holland, showed no ossification in the thyroid cartilage.

A laryngeal examination was made by Mr. Guthrie, who reported as follows: "I examined the larynx of your patient, S. B., again to-day. The larynx appears to me to present definitely male characteristics;

the cavity is very roomy and the vocal cords are both broader and larger than those of the ordinary female larynx. Using a graduated laryngeal mirror, I attempted to measure their length and, although it is difficult to do this with much accuracy owing to the distance between the mirror and the objects reflected in it, I was able to satisfy myself that they measured not less than 24 mm., which is scarcely below the average in the male. The breadth appeared to be nearly one and a half times what is usual in the female. The epiglottis and arytenoids are large for a female, but I think less strikingly so than the true cords and the laryngeal cavity."

The histological findings in this case are probably typical of glandular hermaphroditism, in which there is an ovo-testis on one side only, and therefore merit a short discussion.

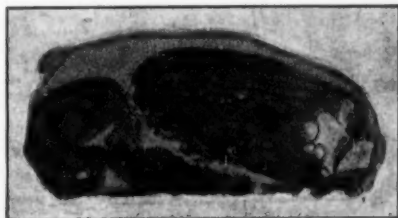


FIG. 4.

Transverse section of part of the ovo-testis, showing dark testicular portion, with lighter capsule of ovarian tissue. At the right-hand side are a few dilated tubules. ( $\times 4$ .)

The right genital gland is a normal ovary, although small and not in a particularly active state. There are to be seen in section a mature Graafian follicle and small hyaline bands in the ovarian stroma, the remains of corpora albicantia (fig. 3).

The histological appearances of the left organ present quite a different picture. A low power view shows that the central portion, which forms nearly the whole of the organ, is made up of what, in the first instance, was supposed by the pathologists to be a malignant neoplasm. A thin capsule of normal ovarian tissue—Graafian follicles, primordial ova and stroma covered in places by capsular epithelium—surrounds this central portion (figs. 4 and 5).

The nature of the central part of the organ is, of course, the interesting feature of the case. It consists of tubules lined for the most

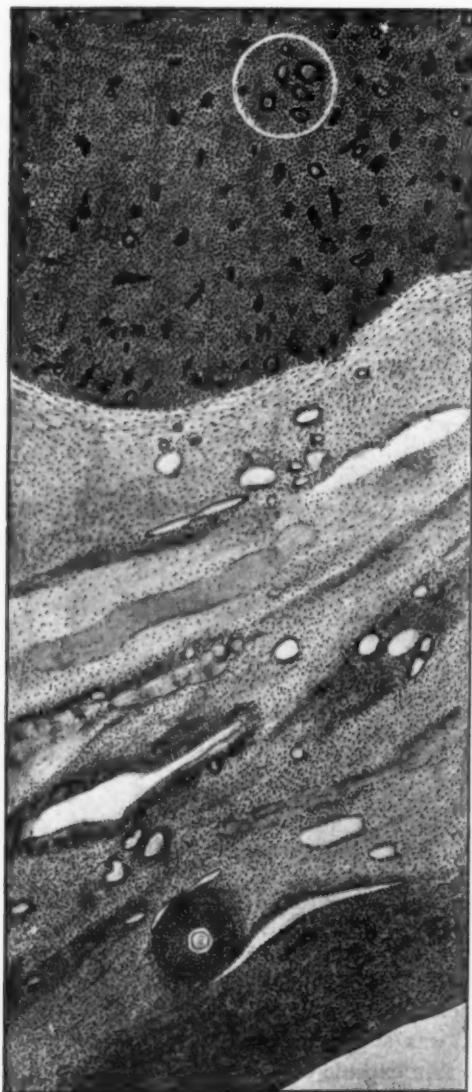


FIG. 5.

Section of ovo-testis, showing central testicular portion (the part that is enclosed in a ring is seen more highly magnified in fig. 9), and outer capsule of ovarian tissue containing a Graafian follicle in the lower part of the field. ( $\times 40$ )

part with several layers of columnar cells, although in places the tubules are seen to be lined with one layer of epithelium (fig. 6), and sometimes to be widely distended with secretion (fig. 7); of irregular masses of similar cells (fig. 8); and, most important of all, of a large number of interstitial cells which are eosinophile, and resemble exactly the interstitial cells of the testicle (fig. 9). There is, too, a large quantity of fat which stains well with Sudan III (fig. 10).

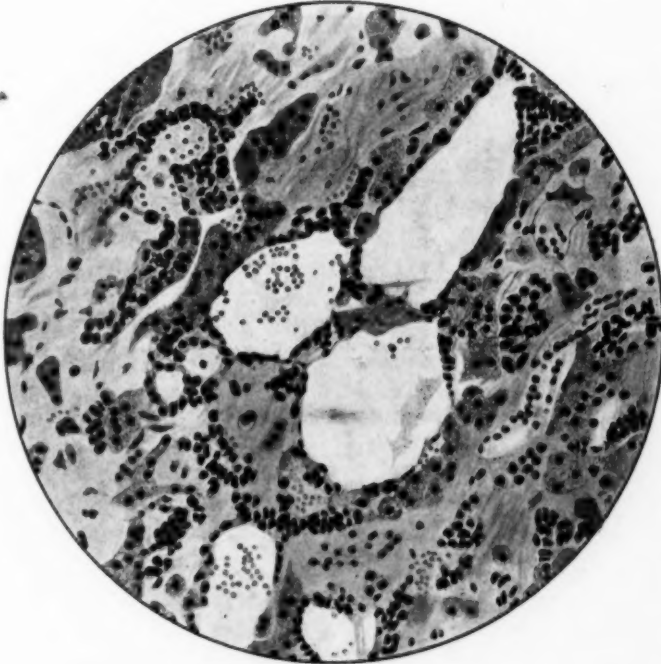


FIG. 6.

Section of ovo-testis, showing seminal tubules lined with a single layer of low columnar epithelium, and interstitial cells. ( $\times 300$ .)

A section through the hilum of the ovo-testis shows that the epoöphoron or its homologue is present, although the structure is somewhat unusual; irregular tubules of large dimensions and containing secretion are seen cut across. These tubules are lined with several layers of polyhedral cells with prominent round nuclei (fig. 11). In places there are giant cells in the walls of the tubules beneath the

epithelium, and they are especially well marked in the small intratubular projections which occur here and there (fig. 12). The nature of these giant cells is doubtful. They are probably due to the irritation of the secretion of the tubules. I would suggest, therefore, that they are similar in nature to the giant cells which may be seen in the walls of the ovarian dermoids [16].

The masses and columns of cells in the central portion of the ovo-

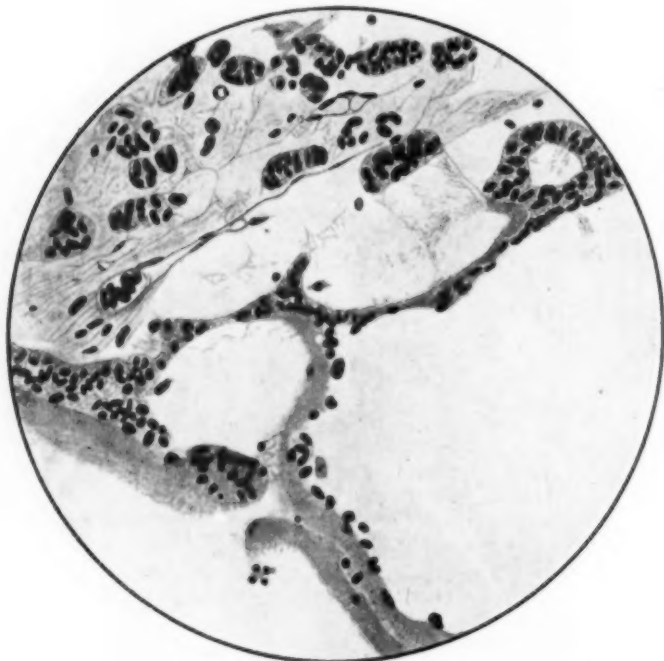


FIG. 7.

Section of ovo-testis, showing dilated tubules containing secretion. ( $\times 300$ .)

testis, which do not form tubules, resemble what may be seen in the early stage in the development of the normal testis; they have none of the appearances of malignant cells, for their nuclei are regular and quiescent, and the cells themselves are nearly all of one size and appear stable in their mode of growth.

With regard to the interstitial cells, it might be thought that they were ovarian and not testicular. As a rule, however, the interstitial



cells of the ovary are much smaller, and never have I seen them so well marked, either in normal or pathological circumstances, as here shown. Further, if these interstitial cells were really ovarian one would expect to find them in the ovarian portion of the ovo-testis, where they are entirely absent, rather than in the testicular portion.

This is the general picture presented by an ovo-testis, but in the histological diagnosis of the condition there must always be difficulty.

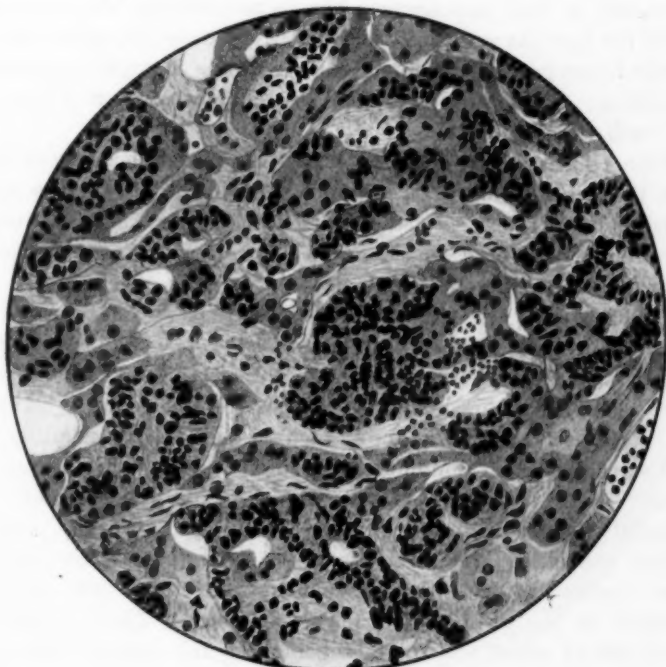


FIG. 8.

Section of ovo-testis, showing masses of cells in irregular arrangement, and interstitial cells. ( $\times 300$ .)

In the first place, there are masses of columnar cells which have no definite tubular arrangement. It was probably this irregularity of distribution which gave rise to the opinion already alluded to, that in this case the growth was malignant. In some parts, of course, there is a definitely tubular arrangement of the darkly staining columnar cells; and in other places tubules may be found lined with a single

layer of epithelium, and containing secretion. There is, however, never any spermatogenesis to be seen.

It is particularly interesting to note in regard to the case recorded above, that the patient commenced life and passed puberty as a normal girl, menstruating regularly for eighteen months; that menstruation had then ceased and masculine characteristics developed, and that in spite of this she suffered from menopausal symptoms after operation. At the present time, nine months after operation, a complete change is to be noted in 'her' appearance: the moustache has fallen out, all the hair on the legs has vanished, the voice is less deep, the skin less coarse, and her figure generally is much more feminine in regard to plumpness and outline. This, surely, is dual sex characterization if ever there were such a thing.

With regard to the occurrence of the gonadal elements of the two sexes in one individual, one would naturally infer, from a developmental point of view, that the different elements would be combined in one organ. A brief consideration of the development of the ovary and testis will make this point clear.

In the earliest stages of development—that is to say, until about the thirtieth day—the histological appearances of the gonads give us no indication as to the future sex differentiation about to take place in these organs. In this undifferentiated stage the gonad is divided into two portions: the *capsular epithelium*, and the central *epithelial nucleus* composed of 'indifferent' cells. Subsequently, however, if a testis is to be evolved, very soon after this date the cells of the epithelial nucleus immediately underlying the capsular epithelium become condensed and form the tunica albuginea, while the rest of these 'indifferent' cells, among which the genital cells lie, become arranged in the form of cell masses or cords. These cords, around which and in which the spermatogonia—as the genital cells are now called—are collected, become the seminal tubules and eventually join the genital tubules outside the gonad. The interstitial cells of the testis are formed from connective tissue cells (mesoderm), which grow in from the direction of the hilum and fill the interstices between the seminal tubules. We shall see presently that the interstitial cells cannot originate from primary or secondary genital cells.

If, on the other hand, an ovary is in process of formation, the 'indifferent' cells (epithelial nucleus) of the genital cell mass remain undifferentiated longer than in the case of testicular development, and they never become arranged in cell masses or cords. Instead, the



FIG. 9.

Section of ovo-testis stained with hematoxylin and eosin, showing seminal tubules and large eosinophile interstitial cells. ( $\times 300$ .)

*BELL: So-called True Hermaphroditism,  
with the Report of a Case.*





FIG. 10.

Section of ovo-testis stained with Sudan III, showing a large quantity of fat among the seminal tubules. ( $\times 60$ .)

*BELL: So-called True Hermaphroditism,  
with the Report of a Case.*





epithelial nucleus becomes broken up by branching septa of ingrowing connective tissue, which divide the ovary into a meshwork of compartments. The tunica albuginea is formed by the meeting of these septa beneath the capsular epithelium. The indifferent cells enclosed in the connective tissue meshwork are believed to form secondary oögonia, but ultimately most of these degenerate and the spaces they previously occupied in the meshwork of connective tissue become filled

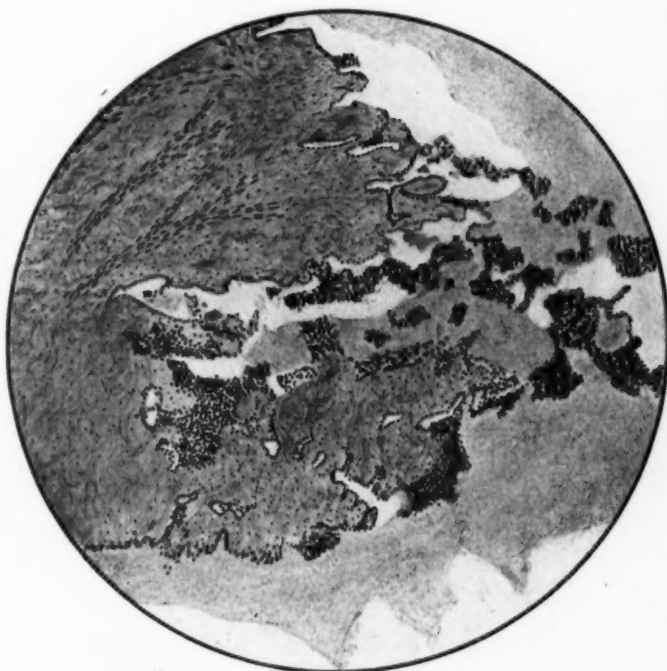


FIG. 11.

Section from hilum of (epoöphoron?) ovo-testis, showing wall of a tubule lined by many layers of polyhedral epithelium, and containing secretion. ( $\times 60$ .)

by ingrowths from the septa. The interstitial cells of the ovary, like those of the membrana granulosa surrounding the surviving ova, are derived from the connective tissue stroma. In these circumstances, of course, the genital tubules atrophy, and their remains may be recognised, extending from the hilum of the ovary through the mesovarium into the mesosalpinx, as the epoöphoron.

We can understand, then, that if there be any hesitancy in the primary determination of sex the seminal tubules may commence to develop in the epithelial nucleus, even though they do not become functional in the ordinary sense of the word; and that the testicular interstitial cells may develop around them. One great difficulty, so it appears to us, and one which requires further elucidation, is why an ovo-testis may be found on one side in these circumstances and

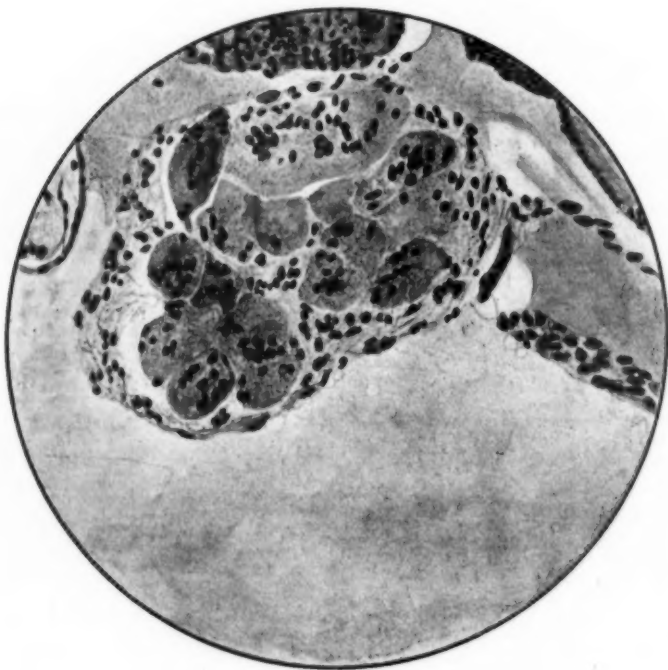


FIG. 12.

Section from wall of tubule (epoöphoron?) in hilum of ovo-testis, showing giant cells in one of the projections into the lumen. ( $\times 300$ .)

not on the other. Nevertheless, the plan of development described above almost negatives the possibility of the development of a separate ovary and testis on the same side; for it is extremely difficult to understand how one part of the genital cell mass could separate itself from the other and develop into a testis, while the remaining portion developed into an ovary.

It would seem, therefore, almost inevitable that, when there is dual characterization in the gonads, the only possible combination must be a testicular central portion surrounded by an ovarian. If this is found not to hold good in any well-investigated case, then we shall have to revise our views concerning the normal development of the gonads and their sex differentiation. It is interesting to observe, in passing, that in those cases in which a testis or a testicular rudiment has been found on the same side, but separated from the ovarian, as in Uffreduzzi's and Foster's cases, no interstitial cells have been present. This alone is enough to throw very grave doubt upon the true nature of the supposed male elements in the gonad concerned. In Simon's case the ovarian portion of the double gonad was, it appears to us, not certainly ovarian. These are the only possible cases which at all controvert the statements made, and their want of conformity renders them doubtful.

We would, therefore, lay down the following as essential conditions which must be established before any case can be considered one of glandular partial hermaphroditism:—

(1) The hermaphroditic gonad must be an ovo-testis, composed of ovarian tissue with definite primordial ova, Graafian follicles or corpora albicantia, surrounding a central portion containing seminal tubules and testicular interstitial cells.

(2) The subject must show in the primary or secondary characteristics, other than the sex glands, evidences of hermaphroditism.

If these conditions be considered critical very few cases, probably only three (von Salen's, Garré's, and Blacker's and Lawrence's), apart from our own, would pass the test.

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- [17] TUFFIER, T., et LAPOINTE, A. *Rev. de Gyn.*, 1911, xvi, p. 209.
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## DISCUSSION.

The PRESIDENT said that the admirable description of this case rendered it one of the most valuable of the very few cases recorded. The most important debatable point lay in the exact nature of that portion of the left genital gland which was at first thought to be a malignant ovary. The microscopical sections proved beyond doubt that a portion was ovary and contained follicles, the other portion Mr. Blair Bell and the eminent pathologists he consulted had satisfied themselves was not a gland carcinoma of the ovary but a modified testicular organ. He would have liked to refer it to the Pathology Committee, but under the present difficult circumstances it was almost impossible for members remaining in town to give up the time necessary to make an adequate study of the very difficult problem involved.

Mr. BLAIR BELL, in reply, said that in order properly to appreciate and determine the histological nature of an ovo-testis, it was necessary to be familiar with the appearances of the normal ovary and testis in the various stages of development, of the undescended testicle, and of the testes from tubular partial hermaphrodites. The nature of the case recorded was dependent not only on the primary sex characteristics—i.e., of the left gonad—but also on the secondary characteristics.

## Obstetrical and Gynaecological Section.

Dr. W. S. A. GRIFFITH, President.

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October 8, 1914.

### Papilliferous Adenoma complicating Fibromyoma of the Uterus.

By JOHN D. MALCOLM, F.R.C.S.Ed.

THE patient from whom this specimen was taken was aged 52 and married, but nulliparous. Menstruation was regular and profuse, continuing seven days, until about eighteen months before she was admitted to the Samaritan Free Hospital. A red discharge then became almost constant for three months and after that all discharge ceased for four months. The red discharge then began again and during the next year gradually increased until it was nearly continuous, but it would occasionally stop for a time, especially at night. A tumour of the uterus rose 3 in. above the pubes and was diagnosed as a fibromyoma. Apart from the condition of the uterus the woman was healthy, and although anæmic was not excessively so, but she felt weak.

Panhysterectomy was unusually easy and the patient's condition seemed quite satisfactory next morning. Gases passed from the rectum within twenty-four hours of the operation, and from the first the patient appeared, and said that she felt, quite well. Her highest temperature was 100·2° F. on the second evening. It then fell a little, but it rose to about 100° F. every evening from the fifth to the tenth day, falling nearly to normal in the mornings. On the tenth day the sutures were removed, after which the temperature fell to normal but rose a few points in the evenings. The highest pulse was 96. As the patient was in all other respects so well this slight rise in temperature and pulse

attracted little attention, and I felt no anxiety about her. In the ordinary course she would have been allowed to sit up out of bed on the fifteenth day after the operation, but the nurses forgot to ask if she might, and she did not get up that day. The house surgeon was called to her in the middle of the following night on account of an attack of breathlessness with extremely rapid pulse, which apparently awakened her. Within three minutes the patient was dead. The last temperature recorded on the chart in the evening of the fifteenth day was 99° 6' F., the last pulse was 88.

A post-mortem examination was made by Dr. Bright Banister, who found the wound soundly healed and the abdominal cavity normal in every way except for some old caecal adhesions and of course the absence of the uterus. There were some old pleuritic adhesions of the right apex. The lungs were emphysematous and their bases were congested. There was no consolidation. In the left pulmonary artery there was a fairly firm clot, extending for 2 in. into the vessel which it completely filled; its appearance was somewhat light for a post-mortem clot; the heart was normal. The brain and spinal cord were not examined, but otherwise the body was healthy. Regarding the cause of death, Dr. Banister wrote that "the only possible cause which can be discovered is pulmonary thrombosis; the reason of its occurrence is entirely absent. There is no evidence of a septic focus for the origin of an abscess."

This was the only occasion on which I have seen in my own practice a patient appear perfectly well for a number of days after an operation and remain apparently well until sudden death took place without any obvious explanation.

When the specimen was incised it was seen (fig. 1) that the fibromyoma was complicated by the presence of a diffuse thickening of the mucous membrane of the body of the uterus, and a section showed that this was due to the presence of a papillomatous growth, a drawing of which is seen in fig. 2.

To the naked eye and under the microscope, that part of the wall of the uterus which is in contact with the new growth of the mucous membrane retains its characteristic appearance, and the line of junction between the normal tissue and the neoplasm is well marked. It is true that the muscle wall is thicker (fig. 1) where it is in contact with the lower part of the new growth of the mucous membrane than it is at its upper part, and it has been suggested that the attenuation indicates an invasion of the muscle wall, but at the top of the figure





FIG. 1.

Papilliferous adenoma, on the left, complicating fibromyoma of the uterus.

where the muscular wall is in contact with the fibromyoma it is also very obviously thicker than it is on the extreme right side of the figure and this difference cannot possibly be due to an invasion of the muscle wall. Under the microscope at many points the new growth dips into the muscular tissue more than is shown in fig. 2, but it is well known that the mucous glands normally penetrate into the muscle, which fully



FIG. 2.

Papilliferous adenoma, showing a well-defined line of demarcation between the tumour and the uterine wall, and a single layer of columnar cells on all the surfaces.

accounts for the intermingling of the muscular and adenomatous tissue. If a section is passed along under the microscope there is everywhere a practically continuous line marking the plane where the new growth ends and the muscular wall begins. In addition to the part figured a further section was carried through an extensive area of the affected

mucous membrane at a distance from the section shown and the characters and relations of the tissues were found the same there also. A small part of the inner surface of the uterine wall is free from growth. The fibromyoma has the appearance of lying in the uterine cavity with its free surface uncovered by even the thinnest layer of uterine tissue, but there was no clinical or other evidence that it was sloughing or tended to be expelled from the uterus. Sections of the part of this tumour in contact with the adenomatous growth show that it was not invaded by the latter.

Thus, so far as can be seen without destroying the specimen, there is a large area of muscle wall covered by the adenomatous growth, at no part of which is there any definite invasion of the muscle tissue by the adenoma, and this although the clinical history indicates that the condition had existed ten months and probably eighteen months. It would appear, therefore, that this is an innocent neoplasm in the sense that it shows no tendency to extend beyond the tissue first affected into adjacent or distant organs.

#### DISCUSSION.

Dr. HERBERT SPENCER considered Mr. Malcolm's specimen was both to the naked eye and microscope a typical adeno-carcinoma and not a papilloma.

Mr. BLAIR BELL supported Dr. Spencer's statement in regard to the histological appearances of the endometrial growth which had been described as an innocent papilloma. He thought that the section showed the growth to be a typical adeno-carcinoma of the endometrium.

*Note by Mr. Malcolm.*—One half of the specimen above described is now preserved in the Museum of the Royal College of Surgeons in the section of *Biology of Neoplasms*, amongst the *multiple growths of different nature in the same organ*. No number has yet been attached to it, but Mr. Shattock, the Pathological Curator, has kindly furnished me with the following description.

#### MR. SHATTOCK'S REPORT.

"A vertical section of a uterus, arising from the muscular tissue of which there is a spherical fibromyoma 10 cm. (4 in.) in diameter. The mucosa over the inner surface of the tumour, together with a thin layer of the subjacent substance of the growth, has been destroyed by ulceration. Histologically the tumour is somewhat unusual in that the bundles of muscle fibres are parted by particularly wide areas of hyaline

connective tissue. The uterine cavity is enlarged in extent and filled with a second neoplasm of a different character. This second growth has a delicate papillary surface, and involves the whole substance of the subjacent endometrium. In the section it measures about 2 cm. ( $\frac{3}{4}$  in.) in thickness, the myometrium beneath is intact. An incision carried through this growth from the back of the opposite half of the specimen (Gynæcological Section, No. A 333b) showed a similar absence of infiltration of the muscular wall. Microscopic examination of the papillary growth shows it to be composed of delicate processes of connective tissue invested with a single layer of columnar cells, the clefts between which processes are prolonged into the glandular substance of the mucosa, the latter having participated in the overgrowth. This tumour may be regarded therefore as a diffuse adenoma, the surface of which is papillary. A portion of the tissue was submitted to Dr. Beckton with the object of testing it for Altmann granules, but he was unable to come to any conclusion, since none of the material had been fixed in formol—Müller solution."

Another specimen in the College Museum exhibits a similar sessile adenomatous growth of the uterine mucosa which does not invade the muscular substance. It is placed with the *Benign Neoplasms*, No. 1537, 1 (No. 4658 A in the old catalogue). This specimen was shown by Sir John Bland-Sutton to the Obstetrical Society in 1907, and described and figured in its *Transactions* (vol. xlix, p. 46). The Pathology Committee of that time (1 c. p. 93) formed the opinion that in this case the tumour showed no evidence of malignancy. The patient's age was 84 at the date of the operation and she was alive and well four years later.

These cases show a marked contrast to the specimen in the Museum of the Royal College of Surgeons (No. A 4664 in the old catalogue). This is classed as an example of *Transformation of benign growths into malignant* and is described as follows: "Half of a uterus, from the mucosa of the body and of the upper part of the cervical canal of which there has arisen an extensive new growth, the mucosa being everywhere involved except for a small area at the fundus. The new formation has a general thickness of 2 cm. ( $\frac{3}{4}$  in.), and presents throughout a vertical 'grain.' On the left side it is sharply limited on the deep aspect and does not invade the myometrium, and may be here regarded as of a simple adenomatous kind. On the right side, towards the fundus particularly, the growth may be traced deeply into the muscular tissue, as far as the serous covering, and is carcinomatous. The general

appearances indicate that the carcinomatous portion has arisen in connexion with a general adenomatous condition. Histological examination shows that cell columns of the growth in places invade the myometrium nearly to its free surface. The cells in the deep extensions are of spheroidal character and completely fill the spaces in which they lie. The complex clefts within the adenomatous areas are lined with columnar epithelium. (Presented by St. Bartholomew's Hospital, 1896.)"

*Report of the Pathology Committee.*—"This Committee reports that the specimen is one upon which conflicting opinions have been expressed. The members of the Committee to whom it was at first referred held the view that the specimen was undoubtedly malignant, because in their opinion it exhibited true infiltration of the muscular wall of the uterus by the growth. The Committee held this day (July 30, 1915) considered the detailed report of Mr. Shattock, the Pathological Curator of the Royal College of Surgeons, appended to Mr. Malcolm's paper. The opinion of the members present (to-day) was divided on the question of malignancy of Mr. Malcolm's specimen."

May 6, 1915.

### Viscera from a Fatal Case of Eclampsia.

By W. GILLIATT, F.R.C.S.

THE patient was an unmarried primigravida, aged 20; though a servant in a doctor's house, her pregnancy had passed unnoticed until the occurrence of the first eclamptic fit, at about the twenty-eighth week.

On February 17, 1915, at 11 a.m., she had a typical eclamptic fit, after which she never regained consciousness. She was removed to the Putney Hospital, and I was asked to see her at 6.30 p.m. There was then no sign of labour, the foetal heart had not been heard for some hours, and she had had twenty-eight fits; after each fit she was comatose for a short time, and then became extremely restless. Chloroform had been administered to enable an enema, rectal and subcutaneous saline to be given and a catheter to be passed. Urine, 4 oz. were withdrawn; it was turbid and dark, contained blood, and solidified on boiling. The chloroform was stopped and morphia was ordered to be given hypodermically; this caused no improvement.

I saw her two hours later, and in view of the continued unconsciousness without any sign of labour, and of the large number of fits, then amounting to nearly forty, decided to do abdominal Cæsarean section. At the time of operation forty-nine fits had been counted, and two or three more occurred during the induction of anæsthesia, ether only being used. The patient was allowed to bleed freely from her uterus during the operation, and 2 pints of normal saline solution were left in the peritoneal cavity. A stillborn male child was delivered.

The patient never regained consciousness nor secreted urine; she had five slight fits and died fifty hours later, in spite of treatment, consisting of morphia hypodermically, continuous rectal saline at intervals, hot packs, and diuretin *per rectum*.

The interest of this case lies in the condition found at the autopsy, made sixteen hours after death. The organ most markedly affected was the liver. There were multiple small subcapsular hæmorrhages throughout, and one of large size on the under surface of the left lobe. On section similar small hæmorrhages can be seen scattered in the liver substance. Microscopically, almost as much of the liver is seen to be degenerate as remains normal. The changes in the cells vary from irregularity of shape to absolute necrosis and disappearance of the nuclei. No thrombi can be seen in the vessels, and very little fat is present. Both kidneys were slightly enlarged and appeared congested, otherwise their naked-eye appearance was normal. Microscopically, the epithelium of the convoluted tubules was swollen. Brain: A large subarachnoid hæmorrhage was present over the whole surface of the left frontal lobe and a small one over the right pre-Rolandic convolution. There was no sign of inflammation in the peritoneal cavity, but a little dark-brown watery fluid had collected in the pelvis. The small sac of peritoneum was distended with a considerable amount of green fluid resembling vomited bile. It was found that there were extensive perforations on both stomach walls. These perforations were of large size, there was no thickening of their edges, and in some parts the ulceration only extended through one or two of the stomach coats. These features are characteristic of perforation due to post-mortem digestion, but it is most unusual to find such extensive digestion of the anterior stomach wall. This not very common condition was first described by John Hunter,<sup>1</sup> and I have been unable to find any reference to such widespread perforation of the anterior stomach wall due to this cause.

<sup>1</sup> *Phil. Trans. Roy. Soc.*, 1772, lxii.



July 1, 1915.

**Papilliferous Carcinoma of the Ovary associated with  
Adenomyoma of the Uterus.**

By JOHN D. MALCOLM, F.R.C.S.Ed.

THESE specimens were taken from a single woman, aged 41, who suffered for one month from pain in the right iliac region extending to the hip and associated with increase in size of the abdomen. The periods were regular. There had been a slight white discharge at times, but otherwise the patient was healthy. A cystic swelling was found in the pelvis on the right side rising nearly to the level of the umbilicus and crossing the middle line. In Douglas's pouch a smaller mass was felt. Both growths were fixed in close contact with the uterus.

The abdomen was opened in the Samaritan Free Hospital on July 28, 1914, before some of the members of the American Congress of Clinical Surgeons. The larger mass was a cystoma of the right ovary closely adherent to the greater part of the back of the uterus, and on separating its attachment some cysts ruptured, showing papillomatous growth within. The left ovary measured about  $1\frac{1}{2}$  in. in diameter, and was also cystic and adherent, but less firmly so. No solid or papillomatous growth was found in it. When the uterus was exposed a small oval growth, about  $\frac{5}{8}$  in. in longest diameter, was seen projecting slightly on its posterior aspect close to the right side and below the point of insertion of the Fallopian tube. The right ovarian cystoma had been firmly adherent all over the back of the uterus on and around this growth. An incision showed that it was not an ordinary fibromyoma, as it had no capsule, and, therefore, the uterus was removed.

The parts have been presented to the Royal College of Surgeons and the Pathology Curator has kindly given me the following description: "The uterus is cut obliquely and viewed from behind, and a black bristle has been passed through the divided right Fallopian tube. Projecting outward from the myometrium on the right side there is a firm unencapsuled tumour about the size of a cherry, the cut surface of which is minutely cystic. Microscopic examination shows the growth to be an adenomyoma of benign character: it is composed

of intersecting bundles of unstriped muscle, between which is distributed a certain amount of columnar-celled gland tissue, the tubules of which are everywhere supported by a highly cellular connective tissue like that of the uterine mucosa. By the side of the uterus is shown half of an ovarian tumour from the right side of the same patient. The gland is enlarged, so as to measure 10 cm. (4 in.) in its chief diameter, by the growth of what, histologically, proves to be a papilliferous columnar-celled carcinoma."

Convalescence gave no trouble, and on June 28, 1915 (eleven months after the operation), Dr. Muir Smith, of Eastbourne, reported that the patient resumed her work as a cook about six weeks after she went home. With the exception of periodic climacteric disturbances she is as strong and healthy as before the tumours developed, and an examination showed no sign of recurrence of the growth. The probability is strong that it will return later.

July 1, 1915.

### **Uterus and a Fibromyoma free from Attachments in a Utero-pelvic Abscess.**

By JOHN D. MALCOLM, F.R.C.S.Ed.

THE specimens were taken from a woman, III-para, aged 40, who gave the following history: She had been in bed six weeks on account of an attack of influenza which ceased fourteen days before March 6, 1915, when she was seized with severe pelvic pain for which she was admitted to the Samaritan Free Hospital on March 8. A similar less severe attack began on February 17 and continued ten days. The periods were regular until January of this year. Since that date the discharge was too frequent and prolonged. For many years the loss had been very free. The patient's youngest child was aged 14, and there had been no miscarriage. The abdomen was soft all over except in the pelvis, which was occupied by a tender indefinite mass of uncertain nature.

On March 12 the abdomen was opened, and the sigmoid flexure was seen firmly adherent over the pelvic viscera, leaving a small part of the anterior surface of the enlarged uterus exposed. The patient was put in the lithotomy position and a trocar and cannula were introduced from

the vagina towards the centre of the mass, but no pus was found. Returning to the abdominal route, the bowel was separated and a large quantity of pus escaped in which the fibroid tumour, measuring about  $1\frac{1}{4}$  in. in its greatest diameter, was found quite unattached. The uterus was gradually separated and brought out of the pelvis. The abscess was bounded partly by the uterus, partly by the sigmoid flexure and its mesocolon. It occupied the greater part of the pelvis, its cavity being about 4 in. in diameter, but the ovaries and tubes were so separate from the pus sac that both were left in the body. As the sigmoid flexure was extensively inflamed a Paul's tube was fixed in the cæcum to rest the lower bowel, and the vermiform appendix, which was involved in adhesions, was removed. No great escape of fæces from the cæcum took place, but after about a week frequency of defæcation and looseness of the stools indicated an irritation of the lower bowel, which seemed to show that the making of a fistula was a wise precaution in that case. The cæcum was closed after eighteen days and the patient then made a satisfactory recovery in every way.

The uterus shows a ragged gap in the posterior wall, its edges tapering off to a thin margin, which in the fresh state was widely open, and before the operation had been continuous with the peritoneum of the bowel and its mesentery. It would appear that the fibroid had become infected by some pus-producing organism and that the inflammation thus induced caused adhesions to adjacent parts and then the abscess expanded into the looser tissue outside the uterus. Possibly the bacillus causing the attack of influenza produced suppuration, but it does not seem certain that the symptoms attributed to influenza were not secondary to local changes around the fibromyoma.

Dr. HEDLEY said that he had operated recently upon a patient on account of pain caused by a fibroid in Douglas's pouch and found a condition which he thought might have led to a result similar to that in Mr. Malcolm's case. In his case the fibroid was subperitoneal, and its pedicle had evidently undergone torsion, as the attachment to the uterus was bloodless and so thin that it broke through when the fibroid was drawn up. Douglas's pouch was roofed in by peritoneal adhesions, and on all sides the fibroid was adherent to the peritoneum around it. The fibroid was dark red on section. He thought that a detached tumour lying in that position might have become infected from the bowel and given rise to an abscess.

July 1, 1915.

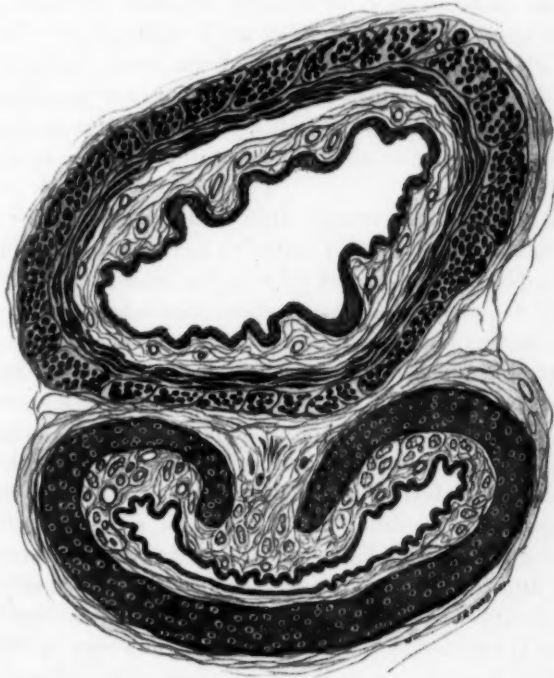
**The Condition of the Larynx and Trachea in the Stillborn Infant and its Bearing on Artificial Respiration.**

By E. A. BARTON.

I AM anxious to draw your attention to one or two points the recognition of which appears to me to be of prime importance in the resuscitation of the apparently stillborn living child, for I have often speculated on the condition of the trachea before birth. It is conceivable that if the trachea were completely filled with fluid the child might be drowned in its first effort at inspiration, and it is equally obvious that the trachea could not contain air. Therefore the trachea must be for the most part a closed tube and the first inspiration must convert a potential into an actual lumen.

On examination of a number of stillborn children in whom no air has passed the glottis I find in the majority of cases the following condition. For about  $\frac{1}{2}$  in. below the glottis, which is invariably closed, the trachea is open, narrowing like a funnel from above down till the point is reached where the lumen is entirely obliterated by the folding in of the ends of the cartilaginous rings behind. The trachea is now flattened from before back, and where the posterior part of the rings meet one another on the dorsal surface is a vertical groove. The muscular posterior wall of the trachea is folded in such a manner that by its contraction the infolded cartilage ends would be separated and an actual lumen be formed from a potential one. This condition holds till the region just above the bifurcation, where the irregularity of the disposition of the cartilages prevents the complete apposition of the surfaces, the lumen again being filled with mucus. This does not, however apply to all cases, as I have found that in a few the trachea is filled with mucus and open throughout its length though flattened, suggesting that some inspiratory effort had been made which, contracting the posterior wall of the trachea, had unfolded the cartilages even with the glottis closed. Such a condition might have taken place at the moment of birth. One may look on the thorax as a whole, then, as an airless, semi-rigid body, the lungs completely atelectatic and the ribs in close contact with them. Therefore at birth the thorax occupies a

smaller space than it can ever occupy after the first breath, be expiration never so complete. There is some reason, too, to suppose that the ribs before the first breath are under an outward elastic tension tending to expand the chest and aiding by their outward spring the completeness of the first inspiration. My reason for this assumption lies in the fact that on opening the chest of a child that has never



Section of trachea to illustrate the folding in of the cartilaginous rings (from microscopic section).

breathed I find that there is a considerable space between the chest wall and lungs, the latter appearing to lie at the bottom of a definite cavity. As the airless lungs cannot alter their volume this cavity must be made by releasing some tension in the chest wall itself.

The first inspiration of life therefore is a very complicated process: the glottis must be opened, the posterior wall of the trachea must contract and by its contraction unfold the curled cartilages, converting a

closed into an open tube, the ribs under their outward tension spring open, and air rushes into the lungs, till now solid. The small amount of mucus in the trachea and larger bronchi is drawn into the lungs, but so small is this amount that in the cry accompanying the first expiration there is seldom any mucous rattling.

The bearing of all these points on the judicious use of artificial respiration is obvious. To attempt to apply Silvester's method to a child who has made no effort to breathe, or rather in whom the glottis is still closed and the trachea empty of air, is waste of precious time. On attempting it one sees the abdominal contents drawn upwards, the chest not expanding in the smallest degree as the ribs are in contact with the solid lung beneath. The glottis must be opened, the tracheal surfaces separated, and then only is artificial respiration possible by methods like Silvester's.

There are many cases, notably after protracted labour or from other causes, when the newborn child makes or has made no attempt at all at the initial inspiration. I do not refer to the infant who having taken a single breath requires but a little artificial encouragement to start on its separate existence, but rather to the flaccid child whose heart is still beating even though at long intervals and in whom possibly Silvester's method has been tried and failed. I am quite sure I have been able to restore life to some infants whom I should have been unable to save before I realized the importance and significance of the anatomical conditions which obtain before the child has made the first voluntary effort at inspiration. The condition of the thorax of an infant before air has entered the glottis is that of a solid body, and any passive attempt to inflate the lungs until the glottis is opened and the tracheal surfaces separated is impossible by any movements directed to that end. The pulling up of the arms to expand the chest has no effect on the glottis, as, owing to there being no air in the chest, there is no inducement for the air to enter, the pressure of air being no greater on the glottis than anywhere else on the surface of the chest. Therefore, the main result of my investigations point to this: If the newborn infant has never made an attempt to breathe and makes no effort the glottis must be mechanically opened either by intubation or blowing into the child's mouth, the latter being performed with the child's nose closed. The small risk of intubation lies in lacerating the vocal cords, and that this is not an imaginary risk I have reason to know; but it is far easier to force a current of air into the chest by holding the child's nose and blowing into the infant's mouth. This may drive air into the Eustachian tubes and middle ear,



and certainly blows air into the stomach, but I have never seen ill-results from either cause. The force used should not be great, and as soon as the lungs are distended any physical or artificial respiration is carried out easily.

#### DISCUSSION.

Dr. AMAND ROUTH said that if Dr. Barton's views as to the occlusion of the trachea in some of the newborn explained the occasional difficulty in their resuscitation, and if this difficulty could be overcome by mouth insufflation, it would tend still further to lessen the number of stillbirths, now known to be about 150 per 1,000 pregnancies, and would also tend to reduce the number of cases (18 per cent.) in which the cause of death was unrecognized.

Dr. EARDLEY HOLLAND thought that the narrow space of the foetal thorax, for the adaptation of the small volume of the unexpanded avascular lungs, was determined more by the high position of the diaphragm than by the attitude of the bony walls of the thorax. He had not noted failure of air-entry into the lungs of stillborn infants on whom artificial respiration had been performed and who had made no respiratory efforts; he had examined a number of such cases and had noted that usually some portion of the lungs floated in water. Although the lungs of such infants had an air-content they had not a good blood-content; alveolar air was obviously useless for respiration unless the alveolar capillaries contained circulating blood. His opinion was that artificial respiration could draw air into the lungs, but could not induce those changes whereby a pulmonary circulation was established. For this reason he had not much faith in artificial respiration.

Dr. ANDREWS said that Dr. Barton's discovery that the glottis was closed until the child made an effort to breathe was of great importance, if correct, because it showed that no method of resuscitation which did not begin with mouth-to-mouth blowing or intubation was of any use in a case where the child had not made an effort to breathe. Any information which would increase our knowledge on the subject of the treatment of stillbirth was most welcome.

July 1, 1915.

# PRESIDENTIAL ADDRESS.

## An Investigation of the Causes which determine the Lie of the Fœtus *in utero*.

By W. S. A. GRIFFITH, M.D.

THE problem of the causes determining the position of the fœtus *in utero* is one which has engaged the attention of investigators from early times, and has throughout led to much speculation on bases supposed to be correct, but which being often wrong lead to wrong conclusions. One of the most obvious and ancient of these errors which appears not to have yet quite died out is that the fœtus lies head upwards until the seventh month, and then takes a dive and lies head downwards during the remainder of its stay in the uterus. It was not until Onymos, Smellie, and William Hunter demonstrated the true facts of this fundamental matter that any real advance began to be made in its explanation.

Hunter says: "All the observations that I have been able to make in dissections and in the practice of midwifery would persuade me that the child's head is naturally downwards through all the later months of utero-gestation, and that neither reason nor instinct teaches it at a particular time any trick of a tumbler or rope-dancer."

Thomas Raynalde in "The Byrthe of Mankynde," 1545, described the position of the fœtus *in utero* (with an illustration plate) in the following terms in the last page of the first "booke": "In the last figure the chylde being a man chylde lyeth after the very manner as it is situat in the mother's womb, with the hed towards the ryght angle or corner of the matrice, and the legges acrosse." He, like some of us, has no respect whatever for the opinion of those who differ from him. He says: "Albeit there be that do describe the lyeing of the childe after another sort, but to be short they are lyars." He particularly says "a man chylde" and that it lies in the right side of the womb, for since Hippocrates taught it, it was believed that males lie in the right and females in the left half, and that a child in the middle must be a hermaphrodite. This book which I exhibit is, as is well known, the first book printed in England with copper-plate engravings.

Mauriceau, 1682, writes: "The fœtus lies head upwards until the seventh or eighth month, then turns head downwards by a natural disposition of the weight of the upper parts of the body." Hugh Chamberlen, in his translation of this, adds a footnote that "this movement is due rather to a natural propensity than to the weight of the head."

In 1743, Josephus Onymos, in an inaugural dissertation published by Haller in the fifth volume of his "*Disputationum anatomicarum selectarum*," p. 325, described with some accuracy the real position of the fœtus *in utero*, and suggests, I believe, for the first time the gravity theory. Section V translated from the somewhat ambiguous Latin reads thus:—

"There exist therefore two properties, which reside in the structure and conformation of the parts, namely, specific weight and volume. From these properties results the proper position of the fœtus, but these parts can be nothing else than the head, wherein no one will doubt these properties dwell. For it is evident that the head is the part which possesses the greatest volume, as mere inspection teaches us. So, too, as anatomical examination of its structure shows, the head has the greatest specific weight, inasmuch as it is denser than the other parts, but where the density is greater there the weight is greater; for it is known from physics that weights are proportionate to densities. We must now, therefore, enter on the further inquiry how the position (of the fœtus) results from these properties and what kind of position. We know from physics, again, that if a body whose density and weight are not uniform throughout is placed in a sufficiently large vessel of fluid, the force wherewith it acts on the fluid is not uniform, so that that part of the body which is heavier than the other descends towards the centre of gravity with the greater force and speed. Now the head is the part which possesses the greatest volume and weight as compared with other parts, and the uterus is a sufficiently large receptacle, full of liquor amnii. Let the internal orifice of the uterus be the centre of gravity, and let the embryo in the uterus be regarded as the body which we have mentioned immersed in fluid; we shall see that the momentum of descent of its heavier part is in direct proportion to its weight, but the weight of its upper part, that is of the head, prevails over that of its lower part, to which must be added its volume; so the head will necessarily move towards the centre of gravity with greater force and speed than the other end. Therefore the head of the fœtus will always occupy the lower part of the uterus."

His physics are not quite in accordance with our present knowledge, and he uses the term "centre of gravity" in a way which I do not understand, but it is clear that the idea underlying his statement is in the main correct.

It is not necessary, however, to spend our time in recalling the history of the various theories which have been advanced, they can be studied in the essay of Cohnstein, "Die Aetiologie der normalen Kindeslagen," *Monatschrift f. Geburtshülfe u. Frauenkrankheiten*, vol. xxxi, 1868, p. 141.

Onymos in 1743 apparently originated the gravity theory and was supported in the eighteenth century by Levret, Fielding, Ould, and Roederer. Gravitation, which as we shall see is the predominating factor, has been discussed since that time and has been accepted and rejected by many authors without an accurate knowledge of the factors which would either prove or disprove its importance. Matthews Duncan strongly supported it, Sir J. Y. Simpson as resolutely opposed it, and it has been a great pleasure to me while investigating the subject to find experimentally that many of the statements made by Duncan based on theory and on crude experiment were correct. I therefore determined to investigate the whole question *de novo*, and I now place the results before you.

An important point necessary to be established was the frequency of the presence of the cephalic end of the fœtus at the lower or upper pole of the uterus during the later middle months of pregnancy. The almost invariable presence of the cephalic end at the end of pregnancy in the lower pole is universally accepted and needs no independent investigation.

The position, however, in the middle months was one less certainly accepted, and I have made use of every opportunity afforded me to ascertain this point, and I am led to agree with Scanzoni, Veit, Dubois, and others that in the middle months the proportion of head lowest positions of live fœtuses steadily increases from 50 per cent. before the sixth month to the almost invariable head lowest position as the mobility of the fœtus *in utero* decreases in the later middle months.

In the early months the embryo is small in proportion to its container and is freely movable within it; as pregnancy advances its mobility becomes more and more restricted as the size of the fœtus more closely approximates the size of its container; and we may conclude that when this correspondence of size is being reached, and the mobility of the fœtus is greatly restricted, it is unlikely that any such great change of position as would be necessitated by a revolution of the fœtus, could be accomplished without some extraneous agent such as is exemplified by external version. And this difficulty of movement, as we shall see later, is greatest when the "lie" is

longitudinal and especially so if the head is lowest, and even more if the head and the lower pole of the uterus lie comfortably in a pelvic brim of corresponding size.

We are fully justified in concluding that if a foetus in the last three months lies head downward in the lower pole of the uterus and in the pelvic brim, it is, under ordinary normal conditions, stable in this position and is very unlikely to alter, except as a result of rotation on its longitudinal axis, and that only to a minor extent. The most important conditions which interfere with its stability are those which increase its mobility, such as hydramnion; and those which interfere with its presenting part lying comfortably in the lower pole of the uterus and in the pelvic brim, such as the presence of placenta prævia, fibroids in the lower uterine wall, solid or cystic tumours in the pelvis, some deformities of the foetal head such as hydrocephalus; great relaxation of the abdominal wall, allowing great mobility of the uterus, may also act in a similar way. If the foetal head does not lie in a brim adapted to its size it will be unstable and easily moved, and so-called transverse or oblique presentations are therefore commonly met with under these circumstances.

No other part of a foetus is so adapted to the normal pelvis as the head; the breech when the presentation is "complete" rarely enters the brim until labour forces it in, though the "incomplete" breech may engage as firmly and with almost the stability of the head.

For the complete consideration of this problem it is necessary to ascertain certain physical properties of the foetus at rest, and of the liquor amnii, and any forces which disturb the foetus at rest.

#### (A) THE FŒTUS.

The foetus, which is a body of varying and not uniform density, is immersed in fluid in a closed cavity of more or less corresponding shape and is for a time freely movable in it; later, as its size more nearly approximates that of the uterine cavity, its mobility is more and more restricted.

My investigations have been directed to the following points:—

- (1) The specific gravity of the foetus at different periods of development and of its most important parts.
- (2) The specific gravity of hydrocephalic and anencephalic fetuses and especially of the head in these cases.
- (3) The centre of gravity of the foetus.

(B) THE LIQUOR AMNII.

This is a fluid of uniform density in each specimen.

(4) We must consider the varying specific gravity of different specimens.

(5) The relative specific gravity of the fœtus and the liquor amnii.

(6) The metacentre or centre of buoyancy.

This is the centre of gravity of the fluid displaced by the fœtus—i.e., the centre of gravity of a substance of uniform density exactly corresponding in shape and size with the fœtus.

It is the centre through which the resistance to the descent of the fœtus, whatever its position *in utero*, must act in a vertical direction.

(7) The relative positions of the centre of gravity of the fœtus and the metacentre.

(C) MOVEMENTS DISTURBING THE FŒTUS AT REST.

(8) Fœtal movements.

(9) Uterine movements—i.e., contractions.

(10) Maternal movements.

In order to illustrate the importance of the specific gravity of the fœtus in relation to this question, let me refer to the chief points in discussion between Matthews Duncan and Sir J. Y. Simpson.

Sir James Simpson had tried to show that the *chief* factor in determining the position of the fœtus was the obovoid shape of the cavity of the uterus acquired during the development of pregnancy, and that the fœtus adapted itself to this shape so as to lie in the most comfortable position.

Dr. Duncan's view was that the shape of the uterine cavity was principally determined by the shape of its contents, and that gravitation was the essential factor in determining the position of the fœtus.

Simpson said: "Most authorities have supposed that the position of the fœtus *in utero* with the head undermost was owing to the greater specific gravity of the head," and that, if this were so, "this position ought to be found with more frequency and certainty when the gravitation of the head from any cause was rendered proportionally greater than natural; with less frequency and certainty when the gravitation



of the head was rendered proportionally less than natural." "The very contrary of this is, however, the truth. In cases of intra-uterine hydrocephalus, the child's head is larger and heavier than usual." "But this condition of the head, this increased preponderance and gravitation of it, does not render head presentations in these cases more common than usual, but the very reverse. Again, anencephalic fœtuses, with the whole brain and arch of the cranium wanting, are still often found presenting naturally."

Dr. Duncan replied thus: "Now this argument, when justly applied, is made to tell most decidedly in favour of the gravitation theory. The altered circumstances of a hydrocephalic fœtus have been altogether misapprehended. The hydrocephalic head, although truly much larger and heavier in air, is *probably* lighter and more buoyant in water. In this way it is demonstrated that the four times greater frequency of abnormal presentations in cases of hydrocephalus proves rather than disproves the influence of gravitation in deciding the position of the fœtus."

With regard to anencephalous fœtuses he hints at the probable error in the argument, but says "We can base no reasonings upon the presentations of anencephalous fœtuses whose statistical conditions we do not know."

It will be seen from these very short abstracts what an important bearing on the question the specific gravity of the fœtus as a whole, and of its chief parts, has had in the discussion of this question, and how important it is that this should be determined. Duncan's theory in both cases was correct, as these experiments prove: the anencephalic head has a very high, the well-marked hydrocephalic head a very low, specific gravity.

I have investigated the specific gravity of sixty fœtuses which include examples of each month from the second onwards. Seven of these showed early or advanced maceration. All the rest were fresh fœtuses without any evidence of having died before labour began. A few, however, of these had to be rejected on account of air having entered the lungs in small quantity, or the stomach and intestines in large quantity as the result of attempts at artificial respiration. This condition was usually suspected by finding a low specific gravity and proved afterwards by examination of the viscera. The omission of this precaution renders the experiments, and any conclusion drawn from them, valueless. An interesting paper recently published by Dr. Charles G. Barnum, of Groton, Connecticut, in the *Journal of the*

TABLE I.—THE SPECIFIC GRAVITY OF THE FŒTUS AT DIFFERENT PERIODS OF DEVELOPMENT.

Reference number and weight	Presentation ; sex	Notes	Whole body	Head	Thoracic and abdominal portion	Thoracic portion	Abdominal portion
<i>Second month—</i> (1) 174 gr. ...	—	—	1.032	1.029	1.035	—	—
<i>Third month—</i> (2) 2½ oz. ...	Female	—	1.036	1.033	1.038	—	—
<i>Fourth month—</i> (3) 2½ oz. ...	Male	—	1.037	1.030	1.040	—	—
(4) 4½ oz. ...	Female	—	1.049	1.046	1.052	—	—
(5) 4½ oz. ...	Male	—	1.040	1.036	1.043	—	—
(6) 4 oz. ...	Male	Right arm, 1.037; right leg, 1.036	1.035	1.031	1.037	1.038	1.036
<i>Fifth month—</i> (7) 11 oz. ...	Breech ; male	—	1.042	1.037	1.045	—	—
(8) 9½ oz. ...	Unknown ; female	—	1.043	1.036	1.046	1.045	1.048
<i>Sixth month—</i> (9) 2 lb. 2 oz. ...	Head ; female	Twins {	1.050	1.050	1.050	1.050	1.049
(10) 1 lb. 12½ oz. ...	Breech ; female		1.049	1.048	1.050	1.049	1.051
(11) 1 lb. 9½ oz. ...	Breech ; male	Hydramnion ; umbilical cord, 1.020	1.046	1.044	1.049	—	—
(12) 1 lb. 3 oz. ...	Breech ; male	—	1.051	1.047	1.056	—	—
(13) 1½ lb. ...	Breech ; female	Maceration begun	1.050	1.048	1.053	—	—
(14) 2 lb. 5½ oz. ...	Head and left shoulder	—	1.050	1.049	1.055	—	—
<i>Seventh month—</i> (15) 2½ lb. ...	Head ; female	—	1.050	1.047	1.052	1.055	1.049
(16) 3¼ lb. ...	Breech ; female	—	1.054	1.051	1.056	—	—
(17) 1½ lb. ...	Breech ; female	—	1.055	1.045	1.057	—	—
(18) 3½ lb. ...	Breech ; male	Right arm, 1.045; right leg, 1.049	1.052	1.053	1.051	1.053	1.049
(19) 3¼ lb. ...	Unknown ; female	—	1.050	1.044	1.054	—	—
(20) 2½ lb. ...	Unknown ; male	—	1.044	1.044	1.045	—	—
(21) 2½ lb. ...	Unknown ; female	One of triplets	1.051	1.047	1.053	1.054	1.051
(22) 3½ lb. ...	Uncertain ; male	Maceration begun	1.058	1.060	1.057	—	—
(23) 2½ lb. ...	Head ; female	Anencephalus	1.050	1.061	1.049	—	—
<i>Eighth month—</i> (24) 4½ lb. ...	Head ; female	—	1.051	1.046	1.053	1.054	1.052
(25) 3½ lb. ...	Head ; male	Maceration begun	1.052	1.051	1.053	—	—

TABLE I—(continued).

Reference number and weight	Presentation ; sex	Notes	Whole body	Head	Thoracic and abdominal portion	Thoracic portion	Abdominal portion
<i>Ninth month—</i>							
(26) 8½ lb. ...	Vertex ; male	—	1.052	1.055	1.051	—	—
(27) 9½ lb. ...	Vertex ; male	—	1.050	1.056	1.048	—	—
(28) 5¼ lb. ...	Vertex ; male	—	1.055	1.056	1.054	—	—
(29) 5½ lb. ...	Vertex ; female	Twins	1.056	1.065	1.053	—	—
(30) 4¼ lb. ...	Vertex ; female		1.055	1.060	1.054	—	—
(31) 6¾ lb. ...	Vertex ; female		1.055	1.059	1.053	—	—
(32) 7¼ lb. ...	Vertex ; female		1.054	1.058	1.053	—	—
(33) 5¼ lb. ...	Vertex ; male	—	1.059	1.059	1.059	—	—
(34) 7¼ lb. ...	Vertex	Left arm, 1.055 ; left leg, 1.051	1.052	1.050	1.053	1.055	1.051
(35) 6 lb. ...	Vertex ; female	—	1.052	1.054	1.048	1.048	1.047
(36) 5¾ lb. ...	Vertex ; female	—	1.050	1.058	1.048	1.051	1.044
(37) 7 lb. ...	Vertex ; male	Right arm, 1.060 ; right leg, 1.058	1.060	1.066	1.058	1.058	1.055
(38) 4¾ lb. ...	Breech ; female	—	1.049	1.046	1.050	—	—
(39) 8½ lb. ...	Breech ; male	—	1.059	1.063	1.054	1.056	1.051
(40) 5¼ lb. ...	Right shoulder ; male	—	1.059	1.059	1.059	—	—
(41) 5¼ lb. ...	Shoulder ; male	—	1.049	1.054	1.045	1.047	1.044
(42) 6¾ lb. ...	Vertex ; male	Maceration advanced	1.049	1.050	1.048	—	—
(43) 5 lb. ...	(?) Vertex male	—	1.046	1.048	1.045	—	—
(44) 4¾ lb. ...	Vertex	Maceration begun	1.055	1.060	1.054	—	—
<i>Hydrocephalus.</i>							
(45) 8¾ lb. ...	Vertex ; male	—	1.042	1.038	1.044	—	—
(46) 7¼ lb. ...	Vertex ; female	—	1.049	1.037	1.059	1.061	1.057

*American Medical Association*, February 6, 1915, p. 498, loses some of its value on this account.

The specific gravity of the foetus and its different parts was calculated

from the difference of weight in air and in water, great care being taken to avoid error from the admission of air into the fœtus and adhesion of air bubbles to the surface when immersed in water. The difficulty of avoiding error was greater when the fœtus was divided for the purpose of ascertaining the specific gravity of its constituent parts. The difference between the head and the rest of the body was ascertained in every case.

A considerable number of fœtuses were divided into three portions: (1) The head; (2) the thorax and arms, including the liver and spleen, which in a fœtus that has not breathed are entirely covered by the lower part of the thorax; (3) the abdomen and legs.

Table I gives the details of forty-six specimens, selected for their accuracy. They show a steady rise in specific gravity as the fœtus develops, and this appears to be largely due to the progress in development of bone, and the amount of bone in the different parts. The smallest embryo (No. 1) weighed 174.1 gr., and was expelled at the end of the seventh week after the last menstrual period. Ossification had commenced in the ribs, long bones, lower maxilla and clavicle. Its specific gravity was 1.032. The largest (No. 27) weighed 9½ lb. and its specific gravity was 1.050.

The tables are arranged according to the month of pregnancy so far as this could be ascertained, chiefly from the menstrual history; in a few cases by the development of the body. I have included in the tables the sex and the presentation of the fœtus where this was certainly known. The small fœtuses of the first four months are so movable that it is often not possible to be sure how they lie and present in the lower uterine segment. In the two of the fifth month, one presented by the breech, the other was not known. In the sixth month three presented by the head, four by the breech and one by the head and left shoulder.

I have omitted from some of the tables a considerable part of the details which I have accumulated as being now unnecessary and only of value to any who are interested in studying the rival theories of past writers. When I began this investigation I was under the impression that the determination of the specific gravity of the fœtus and its parts would give us the answer to the problem. The few points to which I will draw your attention will demonstrate that this is not the case. These are: (1) That in no instance does the specific gravity of the head exceed that of the remainder of the body before the end of the sixth month. It is generally lower and in only one case of the sixth month

was it equal to that of the body. In three only out of nine normal foetuses of the seventh month was the specific gravity of the head higher than that of the body. In two of the eighth month (the only ones I have examined of this month) the specific gravity of the head was lower than that of the rest of the body. In sixteen full-term foetuses the specific gravity of the head was considerably higher in thirteen than the body, equal in two, and lower in one. It will also be noted that up to the end of the sixth month of pregnancy the difference of specific gravity of the three great divisions of the foetus—namely, its head, thorax with the arms, abdomen with the legs—is very slight. During the seventh and eighth months the thoracic portion is the highest, and it is only in the last month that the head is constantly higher than the rest of the body. It is also clearly seen that the relative specific gravity of the head to the body has no necessary relation to the lie of the foetus, whether when quite fresh or in various degrees of maceration *in utero*, and, contrary to theory, maceration hardly affects the specific gravity of the foetus.

Two other matters of interest are demonstrated in these tables, matters which were of much importance in the rival contentions of Matthews Duncan, and Sir J. Y. Simpson. The examination of hydrocephalic and anencephalic foetuses show that the theoretical opinion and arguments of Matthews Duncan were correct. The specific gravity of the two hydrocephalic foetal heads is very low, as low as in normal foetuses of the fifth month—namely, (45) 1.037, (46) 1.039. The head of the anencephalous foetus of the seventh month (23) was very high for the period of development—namely, 1.061. It consists chiefly of bone. The specific gravity of full-term normal male foetuses varies between 1.049 and 1.060, of female between 1.049 and 1.056; the average in nine males 1.055, in seven females 1.053. The specific gravity of the umbilical cord is 1.020, considerably higher than that of the liquor amnii and it therefore sinks when lying free in it.

#### THE SPECIFIC GRAVITY OF THE LIQUOR AMNII.

The present series comprises 112 specimens, of which eight were specially examined immediately after evacuation, as well as when cold, to show the difference in specific gravity under these conditions; the remainder were taken when cold, and were recorded with the age of the mother, the number and duration of the pregnancy, and the sex, length, and weight of the infant; none of which conditions, however,

appear to have any influence on the matter. The table shows that the limits of variation are less than those usually given, the average being 1.007, which agrees with that usually accepted.

Spiegelberg gives the variations as between 1.002 and 1.028, and Whitridge Williams, like many recent writers, gives the same figures. The limits in this series are 1.002 to 1.016, but it will be seen that in the three instances in which the specific gravity exceeded 1.012 there was evidence of some abnormal condition, in two it was of a dark green colour and probably contained meconium, and in the other case the fœtus was macerated; though there are, however, two others containing meconium and one from a macerated fœtus which have a specific gravity nearer the average. This series does not contain any specimens from early pregnancies, but instances recorded by other observers make it probable that there is little variation at the different periods of pregnancy. The large majority in this series are of the ninth month, a few only of the seventh and eighth month.

TABLE II.

In 3 cases the specific gravity was	...	...	...	1.002
" 1 case the specific gravity was	...	...	...	1.003
" 19 cases the specific gravity was	...	...	...	1.004
" 2 " " "	...	...	...	1.005
" 44 " " "	...	...	...	1.006
" 16 " " "	...	...	...	1.008
" 1 case the specific gravity was	...	...	...	1.009
" 19 cases the specific gravity was	...	...	...	1.010
" 4 " " "	...	...	...	1.012
" 2 " " "	...	...	...	1.014
" 1 case the specific gravity was	...	...	...	1.016

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The complete tables, which I do not exhibit, appear to show that the specific gravity of the liquor amnii is independent of the sex, weight, and length of the fœtus, and of the age of the mother and the number of her pregnancies.

TABLE III.—SPECIFIC GRAVITY OF LIQUOR AMNII AT FULL TERM.

At body temperature					When cold
(1)	...	...	1.000	...	1.002
(2)	...	...	1.002	...	1.004
(3)	...	...	1.002	...	1.006
(4)	...	...	1.002	...	1.006
(5)	...	...	1.002	...	1.006
(6)	...	...	1.002	...	1.006
(7)	...	...	1.002	...	1.006
(8)	...	...	1.006	...	1.010



This table shows the low specific gravity of the liquor amnii at the body temperature.

A comparison of the specific gravities of fœtuses and liquor amnii shows an increasing preponderance of that of the fœtus throughout pregnancy, and the fœtus must therefore always sink to the most dependent part of the uterus.

#### FŒTAL MOVEMENTS.

There are two kinds, passive and active. The passive movements of the fœtus are due to its weight and to changes of posture of the mother, such as from standing to sitting, or when lying on the back, or changing from one side to the other, in which the greater specific weight of the fœtus causes it to sink to the most dependent part of the uterus. While the fœtus is small, or when there is a great quantity of liquor amnii, the effect of such movements, as of all others affecting the fœtus, may be of importance, but when the mobility of the fœtus is restrained, the effect must be limited more and more and can at most effect a change laterally as from a first to a second position.

In considering the question of the effects of factors which disturb the fœtus at rest, it is interesting to realize the very small effective weight of the fœtus immersed in liquor amnii of the average specific gravity. This I have ascertained, and find that 7 oz. represent the effective weight of a full-term fœtus of 7 to 8 lb. weight in liquor amnii of this average specific gravity, as it sinks to and rests on the most dependent part of its containing cavity, of which weight about one-third is contributed by the head and two-thirds by the body of the fœtus. The weight of the body may be taken as accurately representing the gentle pressure, which maintains the flexion of the fœtal head on the body when the head is lowest, and the weight of head as representing the still more gentle pressure of flexion where the breech is lowest. This gentle pressure is not augmented until the contractions of the uterus in labour cause a greatly increased pressure on the fœtus and on the passage from the uterus, which has to be dilated for the extrusion of the fœtus.

## ACTIVE MOVEMENTS OF THE FŒTUS.

These are the movements of the limbs, which are often of a sudden and jerky nature; the gentle sliding movements can hardly be of importance as causes of disturbance of the position of the fœtus. Movements of the arms are of less importance than those of the more powerful legs, which being attached to one pole of the fœtus may, under certain circumstances, cause movement of the whole fœtal body.

When the fœtus kicks, its foot or knee strikes the uterus, which is generally flaccid and yields to the pressure, and there will be little movement of the fœtal body. External to the uterus the abdominal walls and contents are for the most part elastic, and as we often see, yield to the pressure of the limbs, but at the lower pole the pelvic brim offers a firm resistance, and movement of the fœtus would be probable if it is freely movable and if the breech presents and the fœtus can kick its mother's pelvis. If, however, as is usually the case, the breech lies in the upper pole and the fœtus is only able to kick the elastic structure between the fundus and the diaphragm, and if in addition the fœtus is not freely movable, the effects of the fœtal movements on its body would be slight and of little importance; and I may repeat the statement that if a fœtus of a size nearly corresponding to that of its container lies with the head in the lower pole of the uterus, and both lie comfortably in the pelvic brim, it is in a condition of stability from which it is not easily disturbed. On the other hand, if a fœtus, owing to its free mobility or from any of the causes previously mentioned, lies in an oblique or other position above the brim, its position is not stable and may vary as the result of its own movements, or of movements communicated to it by the varying positions of the mother.

## MOVEMENT DUE TO UTERINE CONTRACTION.

Contractions of the pregnant uterus are so commonly observed that if they produced any marked change in the position of the fœtus their effect would be well known. I have never seen any such effect, nor do I know of any evidence in favour of it. When the fœtus and uterus approximate in size, their long axes correspond in direction, and it is probable that in the event of their not doing so the contractions of the container would tend to redress any considerable diversity, but would

have little or no effect in determining which end of the long axis of the fœtus occupies the upper or lower pole of the uterus. We are, therefore, probably justified in concluding that the cumulative effects of the natural forces which disturb the fœtus at rest can only act as assistants in adapting the long axis of the fœtus to its container, and while it is freely movable, to enable the only dominant and always present force—namely, gravity—to act efficiently until the position has become stable. We know of no natural factor capable of disturbing it when once this is attained, and if such a change of position is desired we have to employ external version, and even then we are not always able to accomplish it.

#### THE CENTRE OF GRAVITY OF THE FŒTUS AND THE METACENTRE.

This aspect of the problem was suggested to me recently when making inquiries about the methods used by designers for ascertaining the buoyancy and stability of boats and vessels of all kinds on or in water, and with the invaluable assistance of Dr. Womack, Lecturer on Physics at St. Bartholomew's Hospital, I have been able to carry out some experiments to determine these points. While the principle involved is a simple one, the determination of the centre of gravity of the fœtus with sufficient accuracy is not difficult, but the determination of the metacentre involves technical difficulties which can only be overcome by experience and with the aid of an expert in making casts and in modelling. It is this part of the question which has necessitated so much delay on my part in bringing this problem before you.

The centre of gravity I worked at years ago, and the results are interesting as far as they go, but the problem is to be determined by ascertaining the relative positions of the centre and metacentre or centre of buoyancy.

The stability or buoyancy of a boat or any vessel intended to float (see fig. 1) is determined first by ascertaining the centre of gravity of the boat ( $G$ )—that is, the point through which in any position of the boat its weight ( $W$ ) would tend to sink it; secondly, to find the metacentre or centre of buoyancy ( $M$ )—that is, the point through which the vertical upthrust ( $F$ ) of the supporting fluid must act in any position of the boat. This point corresponds with the centre of gravity of the fluid displaced by the boat, and is, therefore, identical with the centre of gravity of any body of uniform density and of precisely the same shape and size as the portion of the boat which is submerged. These two forces, the weight and resistance, are necessarily equal, and if the centres

through which they act coincide, the floating body, unless disturbed by some other agency, would remain at rest in any position in which it is placed. If the centres do not coincide, but are at some distance from each other, and there is no extraneous force to complicate matters, the couple thus formed would tend to rotate the boat until it comes to a position of rest with the centre of gravity vertically below the metacentre, causing it to return to its upright position, or if the position of the centres is reversed, causing it to capsize.

If this principle is applied to the fœtus immersed in fluid (fig. 2), owing to its weight being greater than an equal quantity of liquor amnii, it must be brought to rest by the resistance of the uterine wall

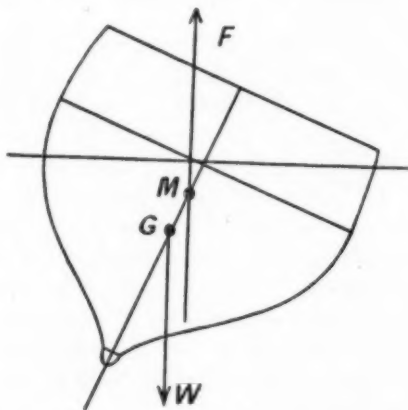


FIG. 1.

*W*, weight; *G*, centre of gravity; *F*, vertical upthrust; *M*, metacentre.

plus the upward thrust of the surrounding liquor amnii, the weight (*W*) of the fœtus acting through its centre of gravity (*G*), the resistance (*F*) through the centre of gravity of the displaced fluid—i.e., the metacentre (*M*)—it must follow that if the two centres do not coincide, the fœtus can only be brought to rest when its centre of gravity lies vertically below the centre of buoyancy. The centres cannot coincide, the liquor amnii is of uniform density, the fœtus is not, so that if the centre of gravity of the fœtus is nearer the head end of the axis of the fœtus than the centre of buoyancy, the head end if free to move must tend to sink to the most dependent part. This tendency will be aided by all movements which disturb the fœtus at rest, to which I have referred.

The instrument used in my earlier experiments for determining the position of the centre of gravity was made for me by the Cambridge Scientific Instrument Company. It consisted of a rectangular table of hard wood perfectly balanced on knife edges: a line is marked on the table uniting the knife edges on which it is supported. This table, though made for large foetuses, was found to be reliable for embryos of the early months. A foetus tied up by thread in the attitude usual *in utero* is laid on the table and adjusted until perfectly balanced; the centre of gravity lies in the vertical plane of the foetus resting on the

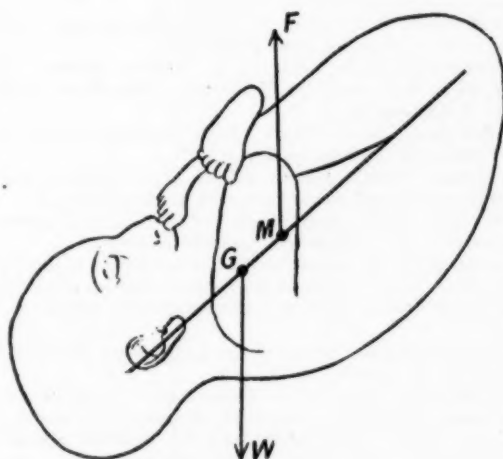


FIG. 2.

*W*, weight; *G*, centre of gravity; *F*, vertical upthrust; *M*, metacentre.

line joining the knife edges. This plane is marked on the foetus. In order to determine the position of the centre of gravity in this plane two other intersecting planes are ascertained by shifting the foetus and then marking them in the same way. Long steel needles are then passed through the foetus in these planes and the point of intersection taken as representing the centre of gravity. This point was without exception close to the upper surface of the diaphragm, at the spot where the inferior vena cava enters the right auricle.

Some details are given of fourteen foetuses of the fourth and

succeeding months and show the distance of the centre from the vertex and the breech, and in some instances the point of intersection of the needles (*see* Table IV).

TABLE IV.—CENTRE OF GRAVITY IN FOURTEEN FŒTUSES FROM THE FOURTH MONTH ONWARDS.

The length of a fœtus is measured from vertex to breech.

- (1) Fourth month, male, length 3·5 in. Centre of gravity is 1·5 in. from vertex, 2 in. from breech.
- (2) Early fifth month, female, length 6·5 in. Centre of gravity is 3·25 in. from vertex, 3·25 in. from breech.
- (3) Early fifth month, female, length 5·5 in. Centre of gravity is 2·6 in. from vertex, 2·9 in. from breech.
- (4) End of fifth month, male, length 7·3 in. Centre of gravity is 3·7 in. from vertex, 3·6 in. from breech (head presentation).
- (5) End of fifth month, female, length 7·1 in. Centre of gravity is 3·5 in. from vertex, 3·6 in. from breech (needles cross in pericardium on the anterior surface of right auricle).
- (6) End of sixth month, female, length 8·25 in. Centre of gravity is 4·125 in. from vertex, 4·125 in. from breech.
- (7) End of seventh month, female, length 12 in. (breech presentation). (Needles cross within pericardium close to right auricle.)
- (8) Middle of eighth month, male, length 11·4 in. Centre of gravity is 6 in. from vertex, 5·4 in. from breech (head presentation).
- (9) Middle of eighth month, female, length 11·1 in. Centre of gravity is 6·5 in. from vertex, 4·8 in. from breech (vertex presentation). (Artificial respiration, partial inflation of lungs, and corresponding descent of heart and liver.)
- (10) Early ninth month, male, length 11·25 in. Centre of gravity is 6 in. from vertex, 5·25 from breech.
- (11) End of ninth month, length 13 in. Centre of gravity 7 in. from vertex, 6 in. from breech (needles cross in pericardium close to right auricle).
- (12) End of ninth month, female, length 13·2 in. Centre of gravity is 7·2 in. from vertex, 6 in. from breech (needles cross in pericardium close to right auricle).
- (13) End of ninth month, male, length 12·4 in. Centre of gravity is 6·7 in. from vertex, 5·7 from breech (vertex presentation).
- (14) End of ninth month, male, length 13 in. Centre of gravity is 6·6 in. from vertex, 6·4 in. from breech (breech presentation).

From this table it will be seen that the centre of gravity is nearer the head than the breech in the specimen of the fourth month only, in the five specimens of the fifth and sixth months it is practically midway, and in seven specimens of the eighth and ninth months it is nearer the breech end.

This gradual displacement of the centre of gravity towards the breech end of the fœtus is apparent, not real, for it will be remembered that in every case tested in this respect the intersecting needles meet at the point where the inferior vena cava enters the heart, so that there is



A diagram of a triangular truss structure. The base is a horizontal beam with a vertical reaction force  $C$  at point  $A$  and a horizontal reaction force  $B$  at point  $D$ . The truss consists of several members, including a horizontal member  $EF$  at the top. A dashed line connects point  $A$  to point  $D$ .

FIG. 3.

The later experiments to ascertain the relative positions of the centre of gravity and metacentre were carried out on a balance designed for me by Dr. Womack (fig. 3). It consists of a horizontal table

suspended by four strings passing from its corners to the rod *EF*. A line, *AB*, across the table, lying vertically below *EF*, is sighted by means of two uprights, *A* and *B*, which are arranged in alignment. The fœtus in the usual intra-uterine attitude, or its replica in wax, is placed on the table and adjusted until the lines *A*, *B*, *C* and *D* are exactly in alignment. Then the centre of gravity will lie in the vertical plane *AB*, *EF*. This plane is marked on the fœtus and the distance measured from this line to the two extremities of the fœtus, vertex, and breech. These measurements record the position of the centre of gravity of the fœtus in relation to its long axis. The metacentre was then obtained by making a plaster of Paris model and a wax cast of the fœtus in exactly the same position and attitude and finding its centre of gravity.

Our early attempts were only partially successful owing to the complicated form of the fœtus, due especially to its folded arms and legs, but I was fortunate in obtaining the assistance of Mr. Fossick, an expert artist in modelling and making casts. He made a mould which could easily be taken to pieces for the removal of the fœtus, and when placed together again enabled him to make an accurate cast in wax of the fœtus.

The two casts I exhibit were made in the Physical Laboratory at St. Bartholomew's Hospital, one in paraffin by ourselves, and one in a wax mixture made by Mr. Fossick. The wax casts represent accurately the fœtuses in size and contour, and therefore represent the liquor amnii as displaced by the fœtus *in utero*, and unlike the fœtus, but like the liquor amnii, they are of uniform density. The centre of gravity of the cast therefore represents the centre of gravity of the displaced liquor amnii and is the required centre of buoyancy or the metacentre. In both these full-time fresh fœtuses the metacentre lies 5 mm. nearer the breech end of the fœtal axis than the centre of gravity, and so far the problem is solved.

TABLE V.—RELATIVE POSITION OF CENTRE OF GRAVITY AND METACENTRE.

- (1) Middle of ninth month, male, 2,954 grm., length 30.5 cm. Centre of gravity is 16.3 cm. from vertex, 14.2 cm. from breech; 8 cm. from nearest point on dorsal margin; 4 cm. from nearest point on ventral margin. Metacentre is 0.5 cm. nearer breech; effective weight, 184 grm.
- (2) Ninth month, female, post-mortem Cesarean section. No moulding of head. Length 31.5 cm., weight 2,500 grm. Centre of gravity is 16 cm. from vertex, 15.5 cm. from breech. Metacentre is 0.5 cm. nearer breech; effective weight, 156 grm.

It may be of interest to add in respect of the purely mechanical questions raised in the paper a few remarks which Dr. Womack contributes on the magnitude of the forces which come into operation. "The foetus (No. 1, Table V), weighing in air 2,950 grm., weight in liquor amnii about 184 grm., the upthrust of the fluid is 2,766 grm. Supposing the foetus first placed with its long axis horizontal, there would thus be a pair of forces each of 2,766 grm. acting at a distance of 0.5 cm. from one another. This constitutes a 'couple' whose 'moment' is 2,766 by 0.5 or 1,383 centimetregrammes. As the foetus changes position this 'moment' diminishes (as it does in most mechanical problems—e.g., the movement of a pendulum, or the closing of a door—but allowing for this, if the rotation of the foetus were unresisted by friction with the liquor amnii or by the passive resistance of the uterine wall, it would result in the foetus rotating into the vertical position in so short a time as one-third of a second approximately. When in liquor amnii, the couple acting on the foetus is still the same, but owing to fluid friction the rotator motion would be slower and uniform. It is, however, not possible to calculate with certainty the time of rotation through  $90^\circ$ , but judging from similar problems met with in hydrodynamics, the time required would be approximately sixty-five seconds. No such rapid rotation is to be expected, the figures are merely given to illustrate the magnitude of the purely mechanical effects if the resistance of the uterine wall is ignored. But the continued action of the couple, always in the same direction, though slow of effect, would be favoured by the intermittent contraction of the uterine wall, the movements of the foetus and of the mother."

In order to complete this investigation, it is necessary to ascertain the relative position of the centres in fetuses of the earlier months. This I intend to do and to bring the results before the Section at a later period.

In this paper I have avoided criticism of the views of others, for I venture to think that the systematic experimental work which I have done will be of more value than criticism, and will, for the future, help to remove much speculation and many sources of error, on which so much that has been written on this subject has been based.

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